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Archives of Neurology and Psychiatry

Vol. I JANUARY, 1919 No. 1

THE MILITARY HISTORY OF THE AMERICAN NEUROLOGICAL ASSOCIATION

PRESIDENTIAL ADDRESS *

THEODORE H. WEISENBURG, M.D.
Major, M. C., U. S. Army

PHILADELPHIA

In times such as these it is particularly appropriate that the work of the Association should concern itself with the military problems brought about by the European War. Three-fourths of the program has been devoted to military topics, and an attempt has been made to cover every neurologic phase. In conveying to our guests our grateful appreciation for their cordial and willing acceptance of the invitation of the Association to read papers before it, I feel that I am expressing the sentiment of every member. The Association is no less thankful to those of its members in active military service who so cheerfully consented to read papers before it.

No previous war has made such demands on the medical profession of all the belligerents and particularly on the neurologists. While of course all wars have produced a great many head, spine and peripheral nerve injuries, with the ever-increasing mechanical methods of warfare and the more general use of artillery, the number of wounds of the nervous system has greatly increased.

After our entrance into the present war it was very soon found that while the bulk of the medical work was largely surgical, there were so many eye, ear, nerve and other injuries that special departments had to be created in the Surgeon-General's Office.

A NEUROLOGIC DEPARTMENT IN THE ARMY

The neurologic specialty is represented in the division of neurology and psychiatry, at the head of which is Col. Pearce Bailey, a former president of the Association. This I believe is the first time that an army has ever created a special neurologic department. Its work has grown tremendously, and while there may have been some skepticism

* Submitted for publication Oct. 30, 1918.

* President's address read at the Annual Meeting of the American Neurological Association, Atlantic City, N. J., May, 1918.

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in the beginning, the work of the neurologists and psychiatrists has been of such exceptional merit that universal recognition has been given it by other branches of the service. So much so that while at first the work of the neurologist was chiefly confined to the examination of the recruit, cantonment and base hospitals, new fields are constantly opening up for which a large number of new men are needed. Division neurologists have been created and new opportunities have arisen through aviation, which as the aviation symposium will demonstrate, is almost altogether a neurologic problem, and one which should be of the greatest interest.

Reconstruction, which is considered by the Surgeon-General's Office as probably the biggest problem before it, is of course of acute interest to neurologists, for about 20 per cent. of the wounded have some injury to the nervous system. Reconstruction units are now in the process of organization, and already a call has been issued for neurologists for this branch of the service.

NEUROLOGIC WORK ABROAD

Abroad the neurologic work is somewhat different, since the mental defects and the undesirable recruits are weeded out in this country, and the neurologist is chiefly concerned with the large group of functional conditions known as shell shock, and the many traumatic injuries produced by shell and bullet wounds. Even now the literature is replete with many excellent studies based on focal and other injuries of the nervous system. It is no exaggeration to say that focal localization of the nervous system will be rewritten as a result of this war.

The work of the Division of Neurology and Psychiatry has been greatly helped by the National Committee for Mental Hygiene. This organization through its medical director, Col. Thomas W. Salmon, who is now at the head of the Division of Neurology and Psychiatry in France, and its able associate medical director, Major Frankwood E. Williams, has been very active in assisting the division in obtaining medical officers, nurses and attendants, and in the organization of Base Hospital No. 117, which is the first American neuro-psychiatric hospital established in France.

This work has been accomplished through its War Work Committee, whose first chairman was Dr. Pearce Bailey. Recently Dr. Bailey resigned, and Dr. Charles L. Dana is now its active head. On the general war committee there are representatives of every neurologic and psychiatric society in the country. Its executive committee is composed of the following physicians:

Charles L. Dana, Chairman
George H. Kirby
E. E. Southard
William L. Russell
Frederick Tilney
T. H. Weisenburg
Frankwood E. Williams

With the exception of two, all of these men are members of this Association. It is particularly fortunate that there exists such an organization as this that can so admirably act as a civilian clearing house for the military division in Washington.

A new Division of Head Surgery has also been created in the Surgeon-General's Office, and a special head hospital is being built of which one of our members, Major Charles H. Frazier, is to be the chief. In this connection it might be well to add that one of our distinguished members, Lieut.-Col. Harvey Cushing, director of Base Hospital No. 5, has been on duty in the war zone since our entrance in the war and is adding fresh laurels to American nervous surgery. Surgeons from all parts of the country, especially adapted for nervous work, have been selected from among other members of the Medical Reserve Corps and special neuro-surgical courses were and are still being given for their benefit. The first to be established was that in Philadelphia in the University of Pennsylvania under the military direction of Major Charles H. Frazier. The second was created in New York under the military direction of Dr. Charles A. Elsberg, the third in St. Louis, under the direction of Dr. Ernest Sachs and the fourth in Chicago under the direction of Major Dean D. Lewis. All of these gentlemen with the exception of Major Lewis are members of the Association. Associated with them were other members of the American Neurological Association who bore the brunt of the teaching.

Under the direction of the Division of Neurology and Psychiatry neuro-psychiatric instruction was given also in New York, Boston, Ann Arbor, Baltimore, Washington and Philadelphia, under the military direction of Drs. W. Timme, E. E. Southard, A. M. Barrett, Adolf Myer, William A. White, and T. H. Weisenburg. As in the neurosurgical courses the bulk of the teaching was done by the local members of the Association.

CREATION OF EXAMINING STATIONS

An interesting development has occurred in the aviation section in the examination of candidates for this branch of the service. Under the direction of Lieut.-Col. Isaac H. Jones a large number of examining stations were created. In these units there is an otologist who does the Bárány tests, an internist and an ophthalmologist. The purpose of these special tests is to determine whether or not the vestibular apparatus is normal. As a consequence a great deal of valuable data has been collected and a lot of information obtained as to the action of the vestibular nerve. But most interesting is the fact that these physicians as well as the large number of surgeons under instruction in the various neurosurgical schools have had their attention called to the importance of the nervous system, and it is safe to say that there

will be a greater interest in the study of neurology and psychiatry after the war.

While war brings about a great deal of misery and an unnecessary amount of unhappiness, at the same time it produces a reawakening in the lives of those who for one reason or another take part. The medical profession and the people indirectly are bound to gain a lasting benefit. Before the war the vast number of those men who now compose the Medical Reserve Corps were general practitioners in various parts of the country, and while they were good physicians, it is probable that most of them were not keeping up with the advances of their profession. This war has brought about a new state of affairs. Men are taken into the service and are given general military training, and if they show any aptitude in a special line are trained in that work. Special courses have been given in almost every branch of medicine in many of the medical centers of the country. While most of these schools are now being abandoned there has been created in Fort Oglethorpe, Ga., probably the largest postgraduate school in the world, and, if the plans of the Surgeon-General's Office go through, instruction will be given in every specialty. At the present time there are over 3,000 Medical Reserve Corps officers on duty. A neuropsychiatric course is included. All of this means that the medical profession will be inspired to do much better work after the war.

Of the 120 active members of the American Neurological Association, twenty-nine have so far accepted commissions. Of these, twenty-six are in the Army, one in the Navy and two are in the service of our allies. Seventeen have served or are still serving as contract surgeons, altogether a very proud showing and in accord with the traditions of the Association. The names of the men who have so far accepted commissions follow:

ARMY

Col. Pearce Bailey.....New York
Lieut.-Col. Harvey Cushing....Boston
Major Herman M. Adler.....Chicago
Major Alfred Reginald Allen.....
.....Philadelphia
Major E. D. Bondurant..Mobile, Ala.
Major Sanger Brown..Kenilworth, Ill.
Major William B. Cadwalader.....
..... Philadelphia
Major Joseph Collins.....New York
Major Charles H. Frazier.....
..... Philadelphia
Major Menas S. Gregory...New York
Major Graeme M. Hammond.....
.....New York
Major J. R. Hunt.....New York
Major Simon P. Kramer...Cincinnati
Major Samuel Leopold...Philadelphia
Major Daniel J. McCarthy.....
....Philadelphia
Major Stewart Paton.....
.....Princeton, N. J.
Major John H. W. Rhein.....
.....Philadelphia
Major Sidney I. Schwab....St. Louis
Major Elmer E. Southard.....Boston
Major T. H. Weisenburg.....
.....Philadelphia
Major Edwin G. Zabriskie..New York
Major Henry Cotton (resigned)...
....Trenton, N. J.
Capt. James B. Ayer.....Boston
Capt. Louis Casamajor.....New York
Capt. George E. Price....Philadelphia
First Lieut. Augustus A. Eshner....
.....Philadelphia

NAVY

P. A Surg. Walter F. Schaller, U. S. N. R. F.....San Francisco

FOREIGN SERVICE

Major Foster Kennedy, R.A.M.C,.....New York (English service)
Lieut.-Col. Colin K. Russell, C.A.M.C.....Montreal, Canada (Canadian service)

CONTRACT SURGEONS

Albert M. Barrett..Ann Arbor, Mich.
Peter Bassoc.....Chicago
Malcolm Andrews Bliss.....St. Louis
Carl D. Camp.....Ann Arbor, Mich.
Charles Macfie Campbell...Baltimore
Allen Ross Diefendorf.....
.....New Haven, Conn.
Charles A. Elsberg.....New York
Edward M. Hummel....New Orleans
Smith Ely Jelliffe.....New York
S. D. W. Ludlum.....Philadelphia
Adolf Myer.....Baltimore
Hugh T. Patrick.....Chicago
James J. Putnam.....Boston
Ernest Sachs.....St. Louis
Alfred S. Taylor.....New York
Frederick Tilney.....New York
Walter Timme.....New York

I have no doubt that every member of the American Neurological Association has in some way or other been of military assistance to the government either as teacher, writer or contributor to textbooks, members of examining or advisory boards or in other civilian capacity. Even before we entered the war a number of our members served in the American ambulance in France in the capacity of neurologist or surgeon. Among these were Drs. Harvey Cushing, John Jenks Thomas, and Daniel J. McCarthy. Others have rendered valuable service in a diplomatic capacity, notably Dr. McCarthy, who as a member of Ambassador Gerard's staff in Berlin did excellent work. Dr. McCarthy wrote up his interesting experiences in a book entitled "The Prisoner of War in Germany." Later on Dr. McCarthy accompanied the Red Cross Commission to Russia. At the present time Dr. Morton Prince, one of our distinguished members, is in Europe on a very important mission for the government.

EARLY HISTORY OF THE ASSOCIATION

As it is, of course, well known the Association first met in New York City on June 2, 1875, as a result of a call issued on December 15, 1874, signed by Drs. William A. Hammond, Roberts Bartholow, Meredith Clymer, J. S. Jewell, E. C. Seguin, James J. Putnam and T. M. B. Cross. There were thirty-five original members. Of these the following eighteen physicians were present at its first meeting:

Meredith Clymer
William A. Hammond
J. S. Jewell
J. J. Putnam
T. M. B. Cross
F. D. Lente
J. J. Mason
F. P. Kinnicutt
A. D. Rockwell
A. McL. Hamilton
S. G. Webber
D. F. Lincoln
E. R. Hun,
John Van Bibber
N. B. Emerson
T. A. McBride
Walter Hay
E. C. Seguin

The other original members of the Association were:

J. K. Bauduy
John C. Shaw
D. B. St. John Roosa
E. G. Loring
John C. Dalton
C. H. Clarke
H. D. Schmidt
S. M. Burnett
J. W. Arnold
Robert T. Edes
F. T. Miles
William Pepper
H. C. Wood
H. M. Bannister
J. S. Lombard
S. Weir Mitchell
Roberts Bartholow

The first presidency was offered to S. Weir Mitchell who was unable to accept, and as a consequence the following were the first officers of the Association:

J. S. Jewell, Chicago, President.
E. H. Clarke, Boston, First Vice-President.
F. T. Miles, Baltimore, Second Vice-President.
J. J. Mason, New York, Corresponding Secretary.
E. C. Seguin, New York, Recording Secretary and Treasurer.
J. W. S. Arnold, New York, Curator.

Of the original thirty-five members, the following seven physicians are alive:

H. M. Bannister
R. T. Edes
E. R. Hun
J. J. Mason
J. J. Putnam
S. G. Webber
H. C. Wood

Fourteen had military service. Besides that there were others with military records but who joined the Association subsequent to its formation. These physicians were:

Daniel R. Brower
S. V. Clevenger
C. K. Mills
Wharton Sinkler
Burt G. Wilder

RECORDS OF OUR EARLY MEMBERS

The Association can well be proud of the records of these men. Chief among these was William Alexander Hammond, Surgeon-General of the United States Army during the Civil War. Dr. Hammond soon after taking his degree in medicine in 1848 entered the U. S. service as assistant surgeon in 1849. He served at various frontier stations, participating in numerous Indian campaigns and occupying his leisure time chiefly with physiologic and botanical investigations. In 1860 he resigned from the military service, but on the outbreak of the Civil War reentered as an assistant surgeon. On account of his previous experience he was at once assigned to administrative work in the organization of hospitals and sanitary stations in which he was so successful as to attract the attention of the sanitary commission, who being dissatisfied with the administration of the medical department of the army successfully urged his appointment as

surgeon-general, he being appointed to this position with a rank of brigadier-general in 1862. The medical department at once improved in its efficiency and, from being scarcely able to provide for an army of 15,000, became fully competent to handle an army of 1,000,000. Dr. Hammond's promotion, however, over the heads of others created a great deal of antagonism, and particularly his masterful and forceful administration so clashed with the spirit of Edwin M. Stanton, then Secretary of War, that he was court-martialed and dismissed from the service in 1864. A review of the proceedings was made by the President of the United States by special Act of Congress in 1878, as a result of which he was restored to his rank and placed on the retired list of the army.

Dr. Hammond founded the Army Medical Museum, called by the senate military committee long after "an institution universally admitted to be one of the proudest scientific monuments of any age or country," and he originated the ambulance corps, which was not adopted until after his displacement.

Dr. Hammond not only contributed largely to the literature, but wrote perhaps the first textbook on neurology in this country, and occupied various important teaching positions. In 1861 he became professor of anatomy and physiology in the University of Maryland and in 1866-1867 in the College of Physicians and Surgeons he delivered the first course of lectures ever given in New York on "Diseases of the Mind and Nervous System," and in 1867 a chair for this branch was created for him in the Bellevue Hospital Medical College; this he held until 1873 and then was transferred to a similar professorship in his alma mater, the University of the City of New York, where he lectured until 1882. In 1882, he and some of his colleagues in the City University resigned their chairs and founded the New York Postgraduate Medical School in which he assumed the professorship of his specialty.

Perhaps the most distinguished member of the Association who saw active service in the Civil War was Dr. Silas Weir Mitchell. Of the many biographical sketches of Dr. Mitchell, the best one is that written by his friend and colleague, Dr. Charles K. Mills. In referring to Dr. Mitchell's war records, Dr. Mills says:

> The Civil War made a profound impression both upon the life and the work of Mitchell. At the time of the breaking out of the war he was a little more than 30 years of age, vigorous and full of the passion to know and to do. He lived in the midst of the recruiting camps, and saw thousands marching through Philadelphia on their way to the front. He had relatives in the Army and had himself a place in the work of the Sanitary Commission and of the Army hospitals. Early in the war he was appointed an acting assistant surgeon in the Army. In two of the large military hospitals of Philadelphia wards for the study and treatment of injuries of the peripheral nerves and central nervous

system were set apart for him. As the war proceeded, in 1863 a large hospital was established at Turners Lane, in what was then a Philadelphia suburb. The concentration here of several hundred patients offered opportunities for study which were seized and improved by Mitchell and his colleagues, Morehouse and Keen.

As a result of his experiences he published many papers. Among the first was "Sudden Palsy, the Result of Gunshot Wounds in Remote Regions of the Body." Then came a paper on malingering and the simulation of paralyses and epilepses. In 1866 he published an important paper on paralysis from peripheral irritation.

New symptoms like causalgia or burning pain, observations on reflex paralysis, new data in diagnosis, and new therapeutic measures, medical and surgical, were among the results of this wartime work. On the foundation of the material first collected and published by him and his colleagues, appeared in 1872 an elaborate and systematic volume by him on "Injuries to Nerves and their Consequences," and many years later a valuable work by his son, Dr. John K. Mitchell, on the remote consequences of nerve injuries based upon a study of the conditions remaining in surviving patients described in the first volume. Mitchell's "Injuries to Nerves" has been translated into several languages and continues to hold first rank in neurologic literature.

Dr. Mills in discussing Dr. Mitchell's writings says:

> Not only was his experience as a surgeon in the Civil War a determining influence in his life as a physician and medical writer, but out of that period came much that crystallized later in Mitchell's novels, dealing as many of them do with hospital incidents and descriptions of the march, bivouac, and battle. An active figure in this heroic period of our country's history, some of his more important novels drew their inspiration from the personnel and incidents of the great war. "Roland Blake" deals largely with the subject of espionage and Grant's sledgehammer campaign through the Wilderness. "Constance Trescott," which the author and others have regarded as his best novel, deals with the reconstruction period, throwing light on conditions in the South after the war. "Westways" brings vividly to the mind of the reader the consolidating antagonisms of the North and the South in the trying period immediately preceding the war, and in this novel is found an excellent description of the Battle of Gettysburg. The militant spirit and the clash of arms are recalled in some of his poems, as in the lyrics of "The Sinking of the Cumberland," and in his drama, "Francis Drake," and "Kearsarge" and "The Eve of Battle.

As can be readily appreciated it has been impossible to obtain a complete military record of the early members of the Association, although a persistent effort has been made by the writer. The record of our first president, Dr. J. S. Jewell, has been difficult to obtain. I was able to get the following information, however, from Dr. H. M. Bannister through the kindness of Dr. Hugh T. Patrick. Dr. Jewell

was connected with the First Illinois Artillery and saw service in Grant's campaign at Donelson and Shiloh.

Dr. Roberts Bartholow, the third president of the Association, like Dr. Hammond, also entered the Army very early in his career, and was one of the force sent to maintain order among the Mormons and Indians in the West in the Brigham Young days. Four years of camping in that wild country gave him wide experience in fevers and gunshot wounds and he no sooner returned home than the Civil War broke out and gave him three more years in military and surgical experience. Dr. Bartholow resigned from the Army in 1864.

Among his appointments were professor of medical chemistry and afterward professor of practice of medicine, Medical College of Ohio, and professor of materia medica, Jefferson Medical College.

His writings included many critical, sarcastic but fascinating articles for *The Clinic*, of which he was founder and editor; also books on "Spermatorrhea," "Materia Medica and Therapeutics," and "A Treatise on the Practice of Medicine."

Dr. Meredith Clymer, one of the signers of the call for the formation of the Association served throughout the entire Civil War. He was medical officer in charge of the sick and wounded in Washington, D. C., during 1862-1863, and medical director of the Department of the South in 1865. He became professor of nervous and mental diseases in Albany Medical College in 1871, holding that position until 1876.

Dr. J. C. Dalton entered the United States service in April, 1861, as surgeon to the famous Seventh New York Regiment, and in August of the same year was appointed brigadier-surgeon of volunteers, and served as such until March, 1864, when he resigned from the Army. After his return to civil practice in New York he resumed his duties at the College of Physicians and Surgeons, being appointed to the chair of physiology in that college. Here he remained until his death. Dr. Dalton was a distinguished author and wrote many excellent papers, among these being "Topographical Anatomy of the Brain," and "Physiology of the Cerebellum."

Dr. Robert T. Edes, one of the five surviving original members, graduated from the Harvard Medical School in 1861 and promptly entered the Navy as an active assistant surgeon. He was commissioned assistant surgeon in the following January and was surgeon of the second division of the mortar flotilla at the capture of the forts below New Orleans, being afterward at Vicksburg and Port Hudson and later transferred to the *U. S. S. Black Hawk*, the flagship of the Mississippi squadron. Dr. Edes resigned in 1865 while attached to the *U. S. S. Colorado.*

In 1870 he was appointed assistant professor of materia medica to Harvard University, professor in 1875, Jackson professor of clinical

medicine in 1884, and in 1891 was elected visiting physician to the Boston City Hospital.

Dr. D. F. Lincoln also served in the U. S. Navy, entering as an acting assistant surgeon in 1862. He was on blockade duty off Mobile, Ala., and Wilmington, N. C. He resigned in 1864.

Dr. F. T. Miles, the second president of the Association and one of its most distinguished members, served in the southern army, entering the line in the regular service and rapidly rose to be captain in an infantry regiment. He was later transferred into the medical service. Dr. Miles was a student of Agassiz and was actually teaching anatomy, being the professor of anatomy in the University of Charleston, when the sound of cannon firing on Fort Sumter broke up the lecture. He with his students immediately joined the Army.

Dr. D. B. St. John Roosa graduated from the University of New York in 1860, and at the outbreak of the war volunteered under the call of the President for 75,000 men, and was ordered in April, 1861, to join the Fifth Regiment, N. G. S., New York, as assistant surgeon, and served with it during its term of enlistment, three months. He reentered the service in June, 1863, for a period of thirty days, serving with the Second Regiment, N. G. S., New York, where he saw service in Pennsylvania.

Dr. H. D. Schmidt was born in Marburg, Prussia. After his graduation in the University of Pennsylvania in 1858, he devoted himself to histology and went South, and at the outbreak of the Civil War he entered the service of the army of the Confederacy, where he served throughout as surgeon, being the second of the original members who did so. At the close of the Civil War he returned to New Orleans, where he was made pathologist to the Charity Hospital, a position which he held for many years.

Dr. E. C. Seguin, the eleventh president of the Association, entered the service as a medical cadet in the Regular Army in 1862 when only 19 years of age. He served two terms in this capacity, the second time in 1863. In 1864, being 21 years old, he received his medical degree from the College of physicians and Surgeons in New York, and then accepted an appointment as acting assistant surgeon and served in Arkansas. Later he accepted a commission as assistant surgeon of the United States volunteers, and as such was mustered out of the service.

Dr. John Van Duyne was also in the Army. One of his old friends writes of him as follows:

> During his cadetship he made an experiment on himself respecting the inoculability of the sloughs and discharges of hospital gangrene which prevailed so extensively in the hospitals of the Union Army. He sacrificed a fair sized area of one arm and covered the wound with a slough. Fortunately the wound healed without causing him any apparent harm. It would become an old man of that day to criticize that act fairly.

Dr. S. G. Webber, another of the surviving original members, entered the Navy on May 22, 1862, and served as surgeon until April 10, 1865. While Dr. Webber furnished me with many interesting details regarding the service of other early members of the Association, he with becoming modesty, refused to say anything about himself. He served with distinction for three years as surgeon in the Navy.

Dr. H. C. Wood, another of the surviving original members, saw some interesting service during the Civil War. After finishing his term as intern at the Pennsylvania Hospital, he entered the government service as contract surgeon, either the latter part of 1863 or early in 1864. His first assignment was in a base hospital in Philadelphia. He served there for three or four months, and was then transferred to a hospital in Washington. Here he remained only a few weeks.

Dr. Wood was then sent as second in command, under the late Dr. Harrison Allen, to a hospital immediately back of Grant's line during the "Campaign of the Wilderness," in the late spring of 1864. This hospital seems to have corresponded to what is now known as "evacuating hospitals." Part of his duties was to take charge of ambulance trains, carrying the wounded to base hospitals. During one of these trips he nearly lost his life through falling asleep on the roof of a car, having given up his berth to the wounded.

Shortly after the end of this campaign he quit the military service, and was appointed to the sanitary commission sent to Richmond. As a member of this commission he was among the first civilians to enter that city after its capture by the Union troops.

A number of the early members of the Association who joined after its formation also saw distinguished service. Among these was Dr. Daniel R. Brower; his record is as follows:

Commissioned by the President, assistant surgeon of volunteers, May 18, 1864. Appointed a captain of volunteers by Brevet, Oct. 28, 1865, "for faithful and meritorious service."

Mustered out by special order No. 581 War Department Adjutant General's Office, Nov. 5, 1865.

First service, U. S. General Hospital, Portsmouth, Va., March, 1864.

Second service, U. S. General Hospital, Hampton, Va., May, 1864.

Third service, U. S. General Hospital, Chesapeake, Va., fall of 1864.

Fourth service, chief medical officer, Military District of Norfolk, Va., spring and summer of 1865.

Fifth service, medical inspector of hospitals under Freedman's Bureau, fall of 1865.

Elected a member of the Military Order of the Loyal Legion of the United States, Chicago, Oct. 7, 1885.

Dr. S. V. Clevenger, who joined the Association in 1882, was the third of the early members of the Association who served in the southern army. He enlisted as a private, and was rapidly promoted

from artificer in the engineer corps to a first lieutenacy by Andrew Jackson, who at that time was governor of Tennessee. Later Dr. Clevenger was appointed to the command of Sherman Barracks in Nashville, a general recruiting rendezvous, which often contained from 3,000 to 5,000 troops. After the war he became a meteorologist in the U. S. Signal Service, and began the study of medicine under Army surgeons. In 1879, while in general practice in Chicago, he turned his attention to the specialty of insanity and nervous diseases, in which he did notable work.

Dr. Charles K. Mills, who became a member of the American Neurological Association in 1881, and its president in 1886, was too young at the time of the Civil War to serve in the Medical Corps, not receiving his degree of doctor of medicine until 1869. In 1862, when he was between 16 and 17 years of age, he served as a private in one of the regiments, the Eighth, P. V. M., known as the blue reserves, called out for the defense of the state at the time of the first attempt of the invasion of the North by Gen. Robert E. Lee. In 1863, when Lee again attempted the invasion of the North and succeeded in entering Pennsylvania with 80,000 men, the village company of which Dr. Mills was a member was one of the first to respond to the emergency call of the President and of the governor of the state, and again went to the front in the old regiment which was this year known officially as the Thirty-Third, P. V. M. Dr. Mills was first corporal of this company. The regiment served during the entire Gettysburg campaign. On the first day of the Gettysburg battle, the brigade of which it was a part came in contact with a force of cavalry and light artillery in Carlisle, Pa., and an engagement occurred which was an outlying part of the first day's battle. On July 13, the regiment took part with a detachment of cavalry of Gen. Judson Kilpatrick's division, the combined force being under the command of Gen. George E. Custer, in an engagement between Hagerstown and Williamsport. The regiment was commended for its excellent conduct in this engagement in a general order of the Commander-in-Chief of the Army of the Potomac, General Meade.

Dr. Wharton Sinkler, the thirteenth president of the Association, became a member in 1881. During the Civil War he served in the ranks of the Second South Carolina Cavalry. He was at that time 17 or 18 years of age, and served as a private.

Dr. Burt G. Wilder, the sixth president of the Association, became a member in 1882. He was made a medical cadet in 1862, serving in this capacity during that year and in 1863, being on duty in a general hospital in Judiciary Square, Washington, D. C., where now stands the Pension Building. After this Dr. Wilder was placed on duty with Dr.

John H. Brinton, Philadelphia, who was then engaged on writing the surgical history of the Civil War. He was then made an acting assistant surgeon, although he had not as yet graduated in medicine. Dr. Wilder then obtained a discharge as a medical cadet, passed the examination as licentiate of one of Massachusetts' medical societies, and was appointed assistant surgeon and served with the Fifty-Fifth Massachusetts Volunteer Infantry, the second colored infantry from that state, and later was made full surgeon and served throughout the war.

Dr. Wilder's work in comparative anatomy and zoology is, of course, well known. He was appointed to the original faculty of Cornell University, where he served for forty-two years as professor of neurology and vertebral zoology, and was made emeritus professor in 1910.

In the Spanish and Philippine wars two members saw active service. Dr. S. P. Kramer held a commission as major and brigade surgeon, and was in command of military hospitals in Havana and Montauk Point. Dr. T. H. Weisenburg was made an acting assistant surgeon in 1901, and served in that capacity in the Philippine Islands during the years 1901 and 1902.

THE TREATMENT OF WAR NEUROSES*

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The following general maxims make no special claim to originality. They are offered, however, as a representation of the experience of the past four years of war, by one who has had the privilege of watching, in England, Malta, Gallipoli, Macedonia and Egypt, the successes and failures of various methods of treatment, both in his own hands and in those of his fellow medical officers.

The writer asks the kindly indulgence of the skilled neurologist. To such a reader, many of the remarks will appear not merely commonplace, but almost childlike in their simplicity. It may be, however, that some less expert reader will find hints of practical usefulness, when brought face to face with the class of cases here referred to.

If our treatment is to be successful, an accurate diagnosis is of fundamental importance. And therefore, before entering on any course of treatment in a case of war-neurosis, the first essential is to obtain as clear a conception as possible of the exact condition with which we have to deal.

COMPLETE HISTORY OF GREAT VALUE

We begin by making a careful *study of the patient*. We inquire not only into his present symptoms, but particularly also as to the time and mode of onset of each of these. No detail, however trivial, should be ignored. The patient should be encouraged to tell his story at some length. If, during the process, he tends to become too long-winded, we must be careful not to betray any impatience or want of interest. The patient will feel dissatisfied if he thinks he has omitted any detail of his history. If time is becoming short, it is better to break off the consultation and to resume it again at a subsequent occasion, rather than let the patient have the feeling that he has left anything unsaid. By tactful questioning we supplement, correct and coordinate the information which the patient offers us. We should be specially careful never to give the patient the impression that we are skeptical as to the accuracy of his statements. When we have reason to suspect him of exaggerating his symptoms, or even of fabricating "decorative" details,

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we must not let him see that we doubt his veracity. Throughout the interview we try to form a judgment as to his degree of intelligence and culture, and also as to his habitual emotional reactions. A patient of low-grade mentality will require to be handled, as regards curative suggestions, differently from a more intellectual patient.

In addition to the history of the patient's present illness, his previous career and his family history should also be inquired into. These are points which sometimes tend to be overlooked by the inexperienced practitioner, who thinks that, if he secures a straightforward account, say, of a shell explosion, followed by certain functional symptoms, this is enough, and that he can proceed right away with a course of treatment. This is a great mistake, for, as a matter of fact, the patient's in-born hereditary tendencies, his previous career and health, his peace-time environment and his reaction to that environment, all have a profound, and sometimes a decisive, influence in determining the manner in which he subsequently responds to the more dramatic incidents of war. First of all, then, we obtain a clear, accurate and complete history.

SYSTEMATIC PHYSICAL STUDY REQUIRED

We next proceed to a methodical physical examination of the patient. This should never be omitted, even in cases which, from the outset, appear to be perfectly simple and straightforward. By following an invariable rule of systematic physical examination, not only do we guard against the unwisdom of accepting and, so to speak, swallowing predigested, some one else's diagnosis (which may be correct, or otherwise), but the mere process of thorough personal investigation has a beneficial suggestive effect on the patient. If we employ a well-designed routine method of investigation, this part of the examination in a case of neurosis takes up only a comparatively short time. But, now and then, it reveals new, unexpected and important clinical facts, perhaps unnoticed by the patient (for example, a hemianopia, or an extensor plantar reflex), which would otherwise have escaped observation, but which may profoundly modify our original diagnosis. A hasty or slipshod examination is always bad. It is bad for the physician, who may thereby fail to grasp some essential point of the case. It is also bad for the patient, if he thinks that the physician is not sufficiently interested in his case; moreover, it diminishes his confidence in the ability of the physician to cure his symptoms.

The interview between patient and physician should leave on the patient's mind the true and sincere impression that the patient, his symptoms, history, and treatment, are the only things in which the physician takes any interest, and that, for the time being, the physi-

cian's whole personality is being focussed on the patient, to the exclusion of everything else in the whole wide world. This ought not to be a matter of pretense or "bluff." The physician, for the time, *should* focus his whole attention on the particular patient before him. Whilst the patient William Smith is in front of him, he has no business to be thinking about the symptoms of Tom Jones who preceded him, nor about James Robinson who may be waiting to see him next. But, the moment William Smith's case is completed, and a few necessary memoranda made about it, the physician should now wipe William Smith clean out of his mind, and focus with equal concentration on James Robinson, from the very moment when Robinson comes in. This faculty of rapid and exclusive concentration on each successive case is one which can only be fully developed by practice. It constitutes one of the most valuable assets in successful diagnosis and treatment.

PERSONALITY OF THE PHYSICIAN

This is an all-important factor for successful treatment. This is no mere platitude. Neuroses, above all other diseases, are those in which one physician habitually succeeds, while another, of equal professional training and knowledge, habitually fails to obtain such good results. The successful physician (I mean the physician who succeeds, not in extracting fees, but in curing his patients) besides possessing a sound knowledge of his subject, must have a justifiable confidence in himself and in his own particular methods of treatment. This confidence he communicates to his patient, not only by words, but by his whole personality, thereby creating an atmosphere of curative suggestion. The physician should exercise authority over his patients, firmly, quietly and with imperturbable good temper. A medical man whose manners are pompous, over-bearing, blustering, or bullying, may succeed in curing a certain small proportion of cases, but these are chiefly among patients of inferior intelligence. I disapprove entirely of employing anything in the form of roughness or painful physical stimulation (practically equivalent to punishment) as a routine vehicle of curative suggestions, although measures of this sort have been carried out and with some success, chiefly in Germany, constituting Kaufmann's so-called *Ueberrumpelung,* or hustling treatment. In this, the patient, previously stripped, is subjected to intense and prolonged faradization or sinusoidal currents (being held down by several assistants, if necessary). This is combined with stern military discipline by the medical officer who "commands" the patient to move the paralyzed limb or to stop a hysterical tremor, the séance lasting, if necessary, for hours, until the hysterical symptom shows signs of yielding. This "curative" séance is followed by a night's sound sleep,

aided by a strong sedative draught. Next day gymnastic exercises are resumed, without electricity, but under the same medical officer who "cured" the patient. This kind of treatment is rarely necessary, and should be reserved for exceptionally chronic and resistant cases. Equally good results are obtainable by kindlier methods, and any feeling of antagonism between the patient and his physician is usually a serious handicap to successful treatment.

At the very outset, the physician should endeavor to secure not only the patient's confidence, but his good-will. Unless the patient is malingering, this ought not to be difficult. We should aim at securing the patient's cooperation in his own cure. As a matter of practice, it is useful, after our careful preliminary examination, to begin by explaining our diagnosis to the patient in simple, nontechnical language, and then to ask him frankly whether he will try and help in his own cure. The patient must be encouraged to feel that we are treating not an abstract disease, but a sick man with an individuality of his own. The first interview between patient and physician may thus be far-reaching and even decisive in its effects, and no effort on the part of the physician should be spared to gain an immediate tactical advantage at the outset of the campaign which is about to follow.

ENVIRONMENT OF GREAT IMPORTANCE

The environment in which treatment of neurotic patients is to be carried out should be carefully selected. That the patient should be withdrawn from the original surroundings under which his symptoms first developed, goes without saying. At the earliest possible moment he should be placed under the care of a trained neurologic physician, preferably in a specially arranged hospital. This should possess a specially skilled staff of medical officers, orderlies and nurses, so that curative suggestions can be concentrated on the patient as soon as possible. By this means, many a soldier who has had an emotional shock, is prevented from developing nervous symptoms, while any symptoms which may have already appeared are "nipped in the bud," and he shortly becomes able to return to his duty.

Segregation of early cases, each patient having a special tent or room to himself, away from other patients, is of special value. The patient, however, must be made to feel that he is not being imprisoned, but that he has been selected for special individual care for a limited period of time, and that meanwhile he is under constant observation by the physician, or by his skilled assistants or nurses. He is thus isolated for a time, not only from other patients, but also from well-meaning but injudicious relatives or friends, whose harmful suggestions play so important a part in the production of hysterical symptoms.

An atmosphere of cheerful, mutual confidence and optimism is essential. This should be created, as already indicated, at the first

interview between patient and physician, and must be carefully maintained. Any physical discomforts which are complained of, such as headache or sleeplessness, are to be promptly attacked by appropriate measures.

The earlier a patient comes under skilled treatment of this sort, the better are his prospects of cure. The confirmed neurotic, or "hospital-bird," who has wandered from one institution to another, gathering pearls of clinical symptomatology by the way, or, in other words, learning new tricks, is much more refractory to treatment than the recent patient who has not yet been examined or treated. The "hospital bird" tends also to have a considerable superadded element of malingering, which helps him to play his part with added gusto, whether to bored or to sympathetic audiences.

How long should the neurotic patient be isolated from his fellows? The answer is, until he shows definite signs of commencing recovery. No hard-and-fast rule can be laid down. In mild cases, two or three days may be enough; in others, several weeks. Each case must be considered on its own merits. If we have a ward in which a number of convalescent neurotics are completing their cure, there is a stage of improvement at which it becomes advantageous for the patient to be released from his primary isolation, so as to have the curative suggestions reinforced by the society of other patients who are farther advanced on the road to recovery. This is toward the later stages of his cure. To congregate together a number of neurotic patients who are not improving, is bad for every one of them. And even when we are handling large numbers of patients in a hospital ward, the individual must never be lost sight of. Conversations between the patient and the physician are occasionally overheard by a neighboring patient. The skilful physician sometimes takes advantage of this to drop a Parthian shot in the form of a well-directed suggestion adapted to a patient other than the one whom he is directly addressing. And in this connection, we must be careful never to do or say anything to humiliate a patient in the presence of his fellow patients. Therefore, when conditions are such as to necessitate the treatment of a number of patients in a common ward, not only should there always be a tactful nurse, or nurses, constantly on duty to supervise treatment and maintain discipline, but a special side-room should be arranged in which private interviews with the physician can take place.

AFTER-TREATMENT AND SUPERVISION IMPORTANT

The return of the patient to his own home should, as a rule, be postponed until the cure is practically complete. Visits by the patient's relatives or friends, restricted to a few minutes' duration, should be

cut down to the minimum, and in most cases, after a single first meeting, should be forbidden, until a certain degree of improvement has been attained. Correspondence should also be discouraged. The patient should be reassured by the promise that any urgent home facts will be duly communicated to him, not directly but through the physician. Even when, at a later stage, visitors are allowed, each friend or relative should be scrupulously warned as to the importance of the atmosphere of encouragement, and should only be admitted to visit the patient on the clear understanding that such an atmosphere will be maintained.

The foregoing maxims are not applicable indiscriminately to every case of neurosis. Symptoms which have been produced mainly by emotional shock or by suggestion are to be treated chiefly by psychical methods; those due to physical concussion or to exhaustion chiefly by physical remedies, such as rest, massage, diet, electricity, etc. Those due to intoxications are the cases in which drugs are most likely to be of value in combating individual symptoms, such as tachycardia, insomnia, etc. Other cases may require to be transferred for treatment to a mental hospital. Hence the importance at the very outset of the careful diagnosis and accurate classification of each patient.

During his entire course of hospital treatment the patient's time must be suitably occupied. For the first few days at least, absolute rest in bed is usually advisable. Then follows a careful program of rest, recreation and work, in due proportion, planned from day to day. Exercise, whether physical or mental, should always stop short of producing exhaustion. Aimless loafing around a hospital ward, "waiting to get well," is sheer waste of time, and tends to encourage professional invalidism. Each patient, after an appropriate interval, should be made to understand that certain duties are expected of him. For a less active patient these duties may consist in assisting in the arrangement and tidying of his room and ward; later, he should be allotted some form of work which has the charm of novelty. Outdoor occupations are usually preferable, for example, gardening and various forms of farm work. Suitable games and amusements, preferably in the open air, are also added to the program. All these are best organized by a resident medical officer, rather than by a visiting physician; an ideal man for such a post should possess the qualities of the genial Father O'Flynn of "ould Donegal":

> 'An' yet for all ye're so gentle a soul
> 'Sure, ye keep all yer flock in the grandest control.
> Checkin' the crazy ones, coaxin' un-aisy ones,
> Liftin' the lazy ones on wid yer stick!

SPECIAL TREATMENT OF INDIVIDUAL SYNDROMES

In each case of hysteria, after careful examination and secure establishment of the diagnosis, a careful plan of treatment is to be selected for that case. The tactics of this campaign, which should be "short, sharp and decisive," will vary with each individual case, according to the patient's mentality and according to his special symptoms, for example, paralysis, contracture, tremor, etc.

The hysterical symptom was originally induced by suggestion, whether from the patient himself or from outsiders, and it has now to be removed by counter-suggestion on the part of the physician and his staff. We begin by confidently assuring the patient that he is curable, and ask him frankly whether he is willing to get well. We then promise him that his cure will begin at our very next interview. If this cannot take place immediately, it is often prudent, while awaiting the crucial moment, to isolate the patient in a room by himself, for not more than a day or two, leaving the recollection of the first interview with its careful examination and promise of cure, to incubate in his mind. In the meantime, during this preliminary period of expectation, his sleep and general bodily functions must be carefully attended to.

After this short preliminary period of isolation and expectation — a period which in favorable cases may be omitted, especially in patients of higher grade mentality — we proceed to the crucial interview of curative counter-suggestion. This interview, which should not take place in the presence of other patients, but in a special room for the purpose, must never be allowed to end without achieving some visible improvement, demonstrated to the patient himself.

Some cases yield rapidly to counter-suggestions, others may require an hour or more. For the curative interview no hard and fast rules can be laid down. It is essentially a contest between the physician's personality and that of the hysterical patient. Each physician must wield his own personality in his own way, varying his weapons in different cases, according to the problem he has to attack. A highly intelligent patient requires more dexterous explanations than a man of coarser fiber. Delicate rapier-thrusts are lost on a rhinoceros-like mentality and we often have to supplement our explanation by an appeal to the patient's imagination, say, by electrical stimulation, which to most laymen is unfamiliar.

If the patient is suffering, say, from hysterical paralysis of a limb, the physician will explain to him in clear, nontechnical language how the weakness has been produced by undue concentration of the patient's mind on this particular limb, which, perhaps, had originally

been the site of some injury. He will show him that the apparent paralysis is not due to any real want of power, either in the muscles or nerves. This part of the explanation is usefully supplemented by brisk faradic stimulation of the affected muscles, thereby demonstrating to the patient that they really can move it. It may be further explained to the patient that, owing to his emotional shock, his brain has temporarily got out of the habit of using the affected nerves and muscles, but that now he realizes that the muscles can and do contract, for example, under the influence of faradism; his own will-power, directed to the same muscles, will also produce the same effect. We therefore "encourage" him to move the paralyzed limb, aiding him at first by faradic stimulation applied to the "motor points." Presently, when he begins to perform voluntary movements, we continue our stimulation, but no longer on the motor points, until finally we are able to demonstrate to the patient that he is performing the movements altogether independently of our electrical stimulation. Often a single interview of this sort, with energetic stimulation, is enough to restore completely the motor power which the patient had believed to be lost.

In cases of hysterical contracture, which not uncommonly accompany hysterical paralysis, during our process of explaining his case to the patient, we passively move freely the contracted joint or joints. Any adhesions which may be present are thereby broken down and the stiffened muscles are stretched and rendered more supple. Passive movements are then supplemented by electrical stimulation of the muscles, and the patient is encouraged to cooperate by voluntary efforts. In this way the patient, who has often become somewhat confused by our various manipulations and by the series of tests applied to the affected part, tends subconsciously to perform some movement of the paralyzed limb. This is the moment to be on the look-out for. As soon as we see the slightest voluntary movement, we pounce on it, call the patient's attention to its presence and show him that he has now ceased to be paralyzed. In his confusion and excitement he repeats the movement, and continues to perform it with increasing power, aided at first by electrical stimulation, until at last he can execute spontaneously all the movements which at first were only carried out passively by the physician.

Hysterical tremor, like hysterical contracture, with which it is often combined, is best treated by repeated passive movements of the affected limb, lasting half an hour, an hour, or longer, accompanied by verbal suggestions, until the muscles have become relaxed. We then encourage the patient to perform active voluntary movements, free from tremor or rigidity.

In hysterical paraplegia of contractured type, we first of all remove the muscular rigidity, and tremor if any, by passive movements and verbal suggestions to the recumbent patient. He is then encouraged to supplement the passive movements by active cooperation and later to perform them unaided. After a rest, these passive and active movements are continued with the patient sitting up. Then, after another short pause, he is persuaded to stand and walk, at first with help and finally unsupported.

Similarly in a case of flaccid hysterical paraplegia, we lift the apparently helpless patient to his feet, supporting him on both sides. We now proceed to march him up and down. Usually the patient makes some sort of feeble movement of the legs to balance himself. We watch for this first movement and point it out at once to the patient, telling him that his cure has begun. We then hustle him up and down, encouraging him all the while, and aiding him by electrical stimulation to the spine and lower limbs, until he can finally stand and walk alone.

It is of great importance to persevere with our curative séance until cure is complete, rather than break off with only a partial cure. And in any case, we must never conclude our curative interview without achieving a definite improvement which is visible to the patient himself and to his entourage.

Special splints or supports, which have sometimes been employed for the correction of hysterical paralyzes and contractures, should be avoided altogether in hysteria. Not only are they unnecessary, but they are positively harmful, since they tend to perpetuate in the patient's mind the suggestion of disability. It should also be borne in mind that splints and other apparatus, originally applied for the maintenance of correct posture in a limb which has some *bona fide* organic lesion of nerves or other structures, may subsequently come to exercise a baneful suggestive effect, so that by the time the surgical injury is healed, the patient has lost the habit of using his muscles. In other words, a hysterical paralysis has become superimposed on an organic injury. In these cases the supporting apparatus is now a hindrance to complete recovery and the patient will carry about his crutch or splint indefinitely, until by counter-suggestion and reeducation, he learns that it is useless. He then discards it, whether on the floor of the physician's consulting room or on the wall of some patron saint's chapel, as the case may be. The importance of motor reeducation in organic injuries is appreciated by every medical officer who has had the opportunity of watching the beneficial results attained in the "curative workshops" attached to our military orthopedic hospital centers.

HYPNOTIC SUGGESTIONS

Hypnotism is rarely necessary and has been discarded by most neurologists. It is open to the objection that the phenomena of the hypnotic trance are themselves essentially hysterical in character, so that by hypnotizing a hysterical patient we are merely replacing one hysterical condition by another. To this it may be answered that it is better for a patient to be hypnotically capable of movement than hysterically paralyzed. As a matter of clinical experience, however, we find that waking suggestions are just as efficacious as those achieved by hypnosis, and their effects are more likely to be permanent.

In cases of obstinate motor disability, and in hysterical mutism, it is sometimes advantageous to give the patient a general anesthetic, to the extent of producing a transient mental confusion. During this stage of intoxication the patient often begins to talk or moves energetically his previously paralyzed limb. As he comes around from the anesthetic, we continue to talk briskly to him and make him go on moving the limb, until, when he finally wakes up to full consciousness, he finds himself carrying out free voluntary movements which were previously impossible. Hysterical deafness is often similarly cured by a general anesthetic, associated with vigorous conversation with the patient as he is coming round, perhaps combined with a touch behind the pinna with a hot Paquelin cautery, so as to concentrate his attention on the affected ear. Hysterical stammering is more difficult to cure than mutism. A considerable proportion of cases give a history of stammering in childhood. To eradicate it, prolonged treatment may be necessary, since the stammer in such patients is merely one of the stigmata of a congenital psychasthenia. Hysterical blindness is often cured by the familiar device of placing a plane lens in front of the alleged blind eye and a strong *plus* lens in front of the good eye, so strong that the patient cannot possibly see through it; or we may drop a mydriatic such as homatropin into the sound eye. We then ask the patient to read. He succeeds in doing so, unconscious of the fact that he is now reading with his supposed blind eye. Once he realizes this fact, cure rapidly ensues.

TREATMENT OF OTHER NEUROSES

Neurathesia, or simple nerve exhaustion, with its excessive fatigue on exertion, be it physical or mental, and its other clinical phenomena, cannot be relieved by suggestion alone, although encouraging suggestions will hasten the process of convalescence. For the treatment of neurasthenia we prescribe rest in bed for a month or longer, combined, in severe cases, with isolation, and in all cases with an abundant diet and with general massage, just as in the ordinary "rest cure" of peace

time. Later on, graduated open-air exercises are added. As a rule, six weeks or longer must be devoted to the cure, if we hope to secure permanent results. Neurasthenic patients of lower grade mentality or of neuropathic heredity are less satisfactory as regards results of treatment than the intelligent patient, free from hereditary taint, and are usually unfit for further military service, except at the base.

Dysthyroidism, with its tachycardia, relative lymphocytosis, etc., may occur either as a pure clinical picture, or it may be complicated by neurasthenic symptoms. But even those patients with well-marked tachycardia progress favorably under graduated open-air exercises under an intelligent instructor and, in time, become fit for ordinary exertion. They tend, however, to remain permanently hypersensitive to emotional stimuli.

Anxiety-neuroses following incidents of war require careful study, with analysis of each individual case. They are best treated by isolation, rest in bed, attention to sleep, psychical analysis (not in the narrow freudian sense) and by encouraging suggestions and reeducation for the stress of every-day life. In such patients analysis of the mental content, inclusive sometimes of dream-analysis, may require long and patient conversations, in which various threads of association in the patient's mind are followed up. Such analyses often have their beneficial effect not merely owing to the "mental katharsis" on which the freudian school lays so much stress, but still more from the self-knowledge which the patient thus attains, a self-knowledge which brings with it self-control.

In all war-neuroses, an atmosphere of confidence and cheerfulness on the part of the medical officer and his staff exercises a profound and beneficial influence on the patient. This is effected not merely by the conscious suggestions imprinted on the patient, but by the development of a happy, "emotional" feeling-tone, entirely reflex and subconscious, exercised through the vegetative nervous system and the endocrine glands.

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WAR NEUROSES

SOME VIEWS ON DIAGNOSIS AND TREATMENT *

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One effect of the war on the medical profession has been to greatly enhance the importance of two special lines of work: (1) orthopedic surgery, and (2) neuropsychiatry.

In prewar days, one might say that these specialties were fighting for proper recognition. Now in England and Canada, at least, military orthopedic surgery includes practically everything but lesions of the brain and the viscera of the abdomen and chest, and the great majority of surgical cases in a military hospital at the base are now looked after by the military orthopedic surgeon.

In the realm of internal medicine and not including the definitely insane, the proportion of returned casualties is about equally divided between the neurologist and the internist. This is due to the fact that we are now beginning to appreciate that the mind is a function of the brain, just as digestion is a function of the stomach and intestines, and as such, deserves at least an equal amount of recognition and study.

FACTORS INVOLVED IN CLASSIFYING THIS WORK

There are several factors that have, up to the present, prevented this fact from being generally recognized in practice:

1. The intangibility of the symptoms of any disorder of the mind.

2. Their frequent and apparent dependence on organic diseases of other parts of the body.

3. Mental specialists, the psychologists, have too often been men insufficiently or not at all experienced in the practical part of medicine and given to express their ideas in obscure phrases, telling us things we all know quite well, but in terms we cannot understand.

There is a fourth reason which is probably more important than any of these: All departments of medicine have struggled through

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all these obstacles which I have mentioned, to the light. The symptoms of heart disease were intangible enough, I have no doubt, until Harvey and his successors by hard, common sense work have lifted the veil. Symptoms referable to any system may be caused by lesions of other organs often far removed, and again in the days not so long passed when the theory of humors was in vogue, certainly there was obscurity enough of phraseology which then, as now, betokened simply the uncertain knowledge.

4. The fourth reason against our more rapid advance in the recognition of psychogenetic (born in the mind) disorders is the natural tendency to play safe. There has been reason for this in the past, but in the present stage of development of the art of medicine, with specialists in all hospital departments where all may come for observation, study and treatment, there is no longer any such excuse. In the meantime, the "raison d'être" has been given for the formation of numerous sects of irregular practitioners, who in turn unquestionably retard the progress of our search after scientific truth.

Our understanding of such functional conditions has been helped by the war because in the great majority of cases, this disturbing idea is, of course, obvious, whereas in the intricacies and unseen influences of civilian life, the disturbing ideas are often complex and obscure.

SHELL SHOCK

In considering this functional or psychogenetic condition in soldiers, I refer to the condition particularly which has come to be known as "shell shock," a term which should not be used but which just naturally catches the imagination of the uninitiated so that it is difficult to eradicate it. In dealing with such cases, it is obviously of primary importance to exclude the presence of organic disease as a cause of the disability complained of, and especially does this apply to the nervous system. Too often the average practitioner has forgotten all he ever learned of this system which, in the army on active service, is more important than most others.

You must be able, also, to exclude any organic disease of the nervous system. You must realize that the mind may be the seat of origin of the disability and you must realize that an individual can be made to change his mind.

Let me now recount a few typical cases of psychogenetic conditions, discussing them briefly as we go along. We will then try to work out a general understanding of their etiology and method of development with an explanation of the treatment.

REPORT OF CASES

CASE 1.—Private S., was admitted to special hospital in England with complete paralysis of both legs; duration six months. Examination showed some impaired movement at the hip joint; practically no power of movement at the knees and absolutely none at the ankles or toes. A slight degree of general wasting below the knees particularly; loss of sensibility of the stocking type reaching to both knees. A pin could be pushed through the calf of the leg without being felt and no bleeding followed, although this operation was repeated several times. Reflexes were normal and the muscles reacted normally to the faradic current. Evidently a straight hysterical condition. This boy had never been to France, but came from what he called a "fighting family." All his brothers had enlisted before he had. He was not a robust type; not given to athletics. He stated that he had paid $150 to have his teeth set right so that he would be accepted in the army. He married in England without obtaining the consent of his officer commanding, so that there naturally was considerable delay in obtaining separation allowance. In the meantime, his wife became pregnant in England where she had no friends or relatives. Without their separation allowance, in his absence, she would only have what money he could assign to her from his pay to live on. Naturally, his desire was not to leave her. During a long route march, with full winter equipment, he had to drop out on account of his feet and on reporting to his medical officer, who it happened was not the regular medical officer of the battalion, but somebody doing his duty, he was told that he had weak feet and ankles, that they would always be a source of trouble to him. He was taken off duty but not sent to hospital. Lying around the cold huts, one can easily imagine that the pain and stiffness in his feet were not improved. In the presence of his desires and his natural lack of robustness, the seed sown by the medical man fell on fertile soil. His feet and ankles very soon became paralyzed and this spread to his knees and he was admitted to hospital where he remained six months before being sent to the special hospital. He was carried from his ward down half a dozen steps to my examining room and, after my examination, I explained to him the origin of his trouble, and the fact that it could be controlled, and in one-half hour that boy went back to his ward, up those stairs walking perfectly. He had regained complete sensibility in the legs, and now each time he was merely touched with the pinpoint, it bled naturally. He was given duty in the hospital in the quartermaster's department and carried on perfectly efficiently.

I can quote another case as similar:

CASE 2.—The patient had paralysis of both legs which had lasted eighteen months, and in which the man had been carried around on a stretcher from one hospital to another, who in the course of one hour after my examination, was walking perfectly. He had similar loss of sensibility and similarly a pin thrust did not bleed nor show any tendency to an infective reaction. His disability originated after being buried and struck on the back with some debris.

I will quote, also, a third case:

CASE 3.—A soldier in the Imperial army had received a bullet wound through the arm in the retreat from Mons, twenty-two months previous to my seeing him. In the meantime, he had been discharged from the army with a paralyzed arm and had received a pension for one year from the British government. On coming up to have his pension renewed, he was referred to me for further treatment. Within fifteen minutes, he was using his arm as well as he ever did.

CHARACTER OF THESE CASES

These cases which have been quoted represent types of genuine hysterical disabilities, but the term psychogenetic is used for practical purposes to cover cases which hardly come in this category. In practice, it is impossible in many cases to differentiate between genuine hysteria and malingering. For instance, take the case of the private who is admitted to my ward in a hospital in France with the diagnosis of epilepsy.

CASE 4.—We received orders, the day following the entrance of this private, to empty the hospital in preparation for new cases. I sent this patient to the convalescent camp, thinking he could be observed there. In the course of a week, he was returned with a note to say that he had two attacks and was in status epilepticus, and that they could not keep him. I camped in the ward with that boy until he had another attack (fortunately, I did not have to wait long), and I saw that it was not idiopathic epilepsy, but a psychogenetic condition.

His story was as follows: He had been at the front for twelve months since the days of the German retreat and had had no leave. He felt that it was due to him. Moreover, he showed me a letter from his sister stating that his brother had been severely wounded and it was a question whether his leg could be saved. His aged mother had taken it very badly and was very ill and praying for his return. He stated that when he thought of all this, he felt so badly and he just seemed to get worse and worse until he had an attack. He thought he could control them. It was explained to him that the army authorities tried to be just, and that if he had been at the front for twelve months without leave, it was certainly due him, but he must realize that to behave in such a manner was really doing the only essential part of himself a greater hurt than the enemy could possibly do him; that if he would control himself, I would send him to the base with the recommendation for leave. He was kept some ten days in the hospital and the change in him was remarkable. He was bright, active and cheerful around the place, and had no more attacks.

Is the foregoing case to be classed as one of hysteria or malingering?

OTHER CASES OF INTEREST

CASE 5.—Private R. was admitted to the special hospital in England on crutches. He was completely paralyzed in his right leg, partially in his left. Since using crutches, he had developed paralysis of his right arm. There was very marked vasomotor changes in the right leg and arm with loss of sensibility. Examination showed no evidence of organic disease and he was told there was no reason why he could not move his limbs perfectly. He stated that he had tried to, not any longer ago than that morning when alone, but could not move them. He was, however, soon persuaded to use his arm and walk perfectly, and he has done so ever since; in fact, I noticed a short time ago that he had received a commission.

His story was this: While in the trenches, he had an attack of sharp pain in the right knee. He volunteered the statement that he had not used his leg as much as he might have and it gradually became more and more useless, and then his left leg became affected. When he began to use crutches, he developed crutch paralysis in the right arm. He had been paralyzed some three months. He said the reason for not using his leg was not on his own account, but on

account of his mother at home. Since enlistment, his father had died and his two brothers had enlisted, his mother was left alone and he wanted to get home to her. He seemed really grateful for his cure. Apparently here we have a case of hysteria developing on a basis of malingering.

Case 6.—Private McK. was admitted to this special hospital in England complaining of complete blindness, paralysis of the left arm and weakness of the right leg; duration six months following being buried. He came to me after having been in the National Hospital, Queens Square, London. On examination he had complete loss of sensibility in the left arm. After examining him, and finding that his condition was psychogenetic, I expressed my surprise that he had been turned out of that hospital in that condition, knowing the type of work that is done there. I naturally inquired what medical officer had seen him and stated my intention to inquire into the matter. This I imagine worried him for, in the middle of my explanation to him of his condition and the cause of it, with a great cry he suddenly recovered his eyesight and his power in his arm and leg. We had many rapid cures, but this was too rapid to be convincing. He told me he was a medical student at Johns Hopkins Hospital and stated he had been eighteen months in the front line. I did not inquire further into his medical studies, but realizing that he was not suitable at present for front line work, I had him attached to the hospital as an orderly. Some doubts were thrown on his statement when he said that he had taken an arts course before he had studied medicine, and on being asked what branch of study he had taken up in this course, he replied, "Music and painting." It was superficially noted, also, that for a student of Johns Hopkins Medical School, his technical knowledge was rather weird. However, from a military point of view, this did not interest us.

Some two weeks later, after his affectionate advances had been turned down by their object, he came to my examining room again completely blind. I was not altogether surprised as I had been consulted by the mother of the lady in question and knew the inside history of the case. His own story given to me was a tissue of lies. Added to this, he was already married. When threatened with court-martial, he recovered his eyesight very promptly and was returned to general service in France. This was a year and a half ago, and I heard nothing more of him until a month ago when, on a trip of inspection in Halifax, I met him again. This time he had paralysis of the arm. He had told the same story of being a medical student at Johns Hopkins Hospital, whereas in reality, he worked in a garage in Boston before the war. He now stated his disability was due to being sprinkled on the left shoulder by pieces of shrapnel. He had multiple small scars, but close examination showed that they were all over his shoulders and back, and were due to a severe acne.

Examination of the arm showed no organic lesions. He stated that he had been nine months at the front after I had discharged him to duty, and admitted he had not been wounded, but could not give any reason for the paralysis of his arm except that it was a recurrence of the old condition. He had again lost complete sensibility in his arm, and pin thrust through the arm did not bleed. He was given strong electricity with the idea of giving him an excuse for recovering, but this made no impression. I then saw him alone, warned him that I would give him two minutes to use his arm, in which case he would be discharged without pension or if he did not, he would be court-martialed. He knew that I knew his whole story and could judge how it would appeal to a jury at a court-martial. The result was that he moved his arm perfectly and just as well as the other in the stated time. Following this, examination

showed that whereas a few minutes before a pin thrust was not felt and would not bleed, now the slightest pinpoint was felt and bled naturally. As far as I can see, the only factor to account for this was a purely mental one which consisted in influencing him to change his mind and make his intellect govern his desires.

GENERAL CONSIDERATIONS REGARDING SHELL SHOCK

Let us consider now some points of general interest in the study of this so-called "shell shock."

(*a*) During a period of six or seven months when in charge of the neurologic ward of a general hospital at the base in France, where I saw most of the cases of neurologic interest in the surgical wards as well, I never saw the symptoms of shell shock in a wounded patient. Later when in England in charge of the medical side of a special neurologic and orthopedic hospital, I did see a few such cases, but they were always in cases when the wound had been rather slight, and should not have been sufficient to have made it necessary to send the man back to England by itself, or in patients who had recovered from a wound, and when there was a question of them returning to France again, the symptoms of shell shock developed.

(*b*) We do not find shell shock in our German prisoners; the Germans report there is no "grenade fever" among the prisoners whom they have taken. These men have been exposed to the same effects of shell explosion as men who have not been taken prisoner.

Some observers have advocated the view that there is a definite organic basis underlying shell shock and have imagined a condition of diaschisis where the terminal dendrites of one neuron have been as it were shaken loose from the associated cells so as to make a break or disturbance in the connections in the association tracts, but it is interesting to notice severe wounds of the brain without the slightest evidence of disturbance of the mental mechanism — evidently, then, it is not an organic lesion.

(*c*) I made a detailed study of some sixty cases of psychogenetic conditions picked at random from the files, and these showed that the average time in France for the whole of this series was two years and eight months, but if we exclude eight of these cases who did spend a considerable time at the front before breaking down, the average time for the rest is reduced to one year and nine months. Nine had never been there at all.

Evidently, the only common experience in all these cases was that they were exposed to danger or under the apprehension of being exposed, and the explanation of shell shock not being found in prisoners, either our own or those of our enemies, is that they were no longer exposed to such danger or were not under the apprehension of it.

PRIMITIVE INSTINCTS OF MAN

To understand the full meaning of this, we must go back to the primitive beginnings and consider the primitive instincts. We must first appreciate the fact that an instinct is primitive innate tendency. There are two essentially primitive instincts; the instinct of self-preservation, and the instinct of procreation. These are primitive; they must have been present in the early beginnings of animal life. Their absence in an individual would certainly have assured that he would not be represented in the present generation. These instincts are born in us. They are tendencies, that is, a constant leaning or urging in a certain direction; and it is only relatively late in the development of man that he has, with the development of his larger brain, learned by experience to control the urging of these instincts. Their urging is, nevertheless, constantly present, and at times, it becomes insistent.

If in an individual there has been a lack of development of the higher centers producing a condition of mental deficiency or feeble-mindedness, it will readily be seen that there will probably be less control of these instincts and their peculiar emotions; and, in fact, it has been found that it is a bad economic proposition to spend time and money in endeavoring to make soldiers of this class of individual. A certain number of these individuals were enlisted during the voluntary enlistment period owing to the enthusiasms to fill up the ranks of a battalion, and many of them have come back diagnosed as "shell shock." We must also recognize the fact that as the necessary mental control involves effort which might be compared to a physical effort, in that it produces physical fatigue, and as we all have our individual physical limitations, there comes a time when this effort becomes well nigh, if not completely, impossible. For example, if a man has stood the strain for twelve to eighteen months in the line, I personally do not feel like criticizing him for losing his control under exceptional conditions.

INSTINCT OF SELF-PRESERVATION

When a soldier is first introduced to the fighting line, or even under the apprehension of that danger, his instinct of self-preservation will be strongly stimulated, and he will suffer from the emotion peculiar to that instinct, namely, fear. That is natural. Ordinarily the discipline he has learned and his own self-respect are sufficient inducements for him to exert his intellectual power in controlling the impulses set up by his emotions. This intellectual power is, as I have said, a more lately acquired faculty and is more subject to local influences. Lack of sleep or food, or the general malaise associated

with a fever, or anything else that interferes with his feeling of well-being, will lessen his intellectual control. Under such circumstances, the sudden onset of some great danger or horrible experience will stimulate his primitive instinct of self-preservation, whose center is probably in the basal ganglions. The radiations or impulses set up by the stimulation of that center, like the radiations from a powerful wireless station, jam the radiations which are set up in the relatively weakened cerebral centers, so that their message can no longer be read. When one sees a man pulling his rubber sheet over him to hide himself from the shells, one realizes that here is a vivid example of the old instinct of flight and concealment, and that such an individual's higher centers are not acting as they should. Under such circumstances, in the absence of the censor as it were, that individual becomes very suggestible. He is in a mental condition ready to believe anything, especially anything that will relieve him of his fear and relieve the anxiety of his guardian instinct of self-preservation.

MUTISM

In studying cases of mutism, for example, one is led to the following interpretation: one realizes that there is a very close association tract between the emotion fear and the voice centers. If a child is frightened, it cries. The warning cry of animals is the cry of fear. Under intense fear the natural reaction is to cry out. Fear is often so intense that the individual cannot cry, his throat muscles having gone into spasm owing to the strength of the stimulus. When, however, that fear is passed, when the individual attempts to use his voice, owing to the close association tract already mentioned between the voice center and the center of fear, there is immediately called up in his mind the picture of the extreme terror under which he was placed. The mind has a natural protective method of suppressing anything that is unpleasant. If one has a recurring unpleasant thought, he will immediately think of something else. He will shove it down out of consciousness. So in this case the thought of the terror being decidedly unpleasant, the mind suppresses it, and with it the voice—so that it will not be recalled.

FUNCTIONAL DISTURBANCES

In the same way the functional paralysis of the arm may result from an injury received when the individual is suffering from great emotional strain. The natural reaction to fear, the quickening of the heart, the shaking of the knees, the profuse perspiration, the involuntary micturition, strange and unaccustomed symptoms to the ordinary individual, become very potent suggestions of organic disease.

Take, for example, the man who after a week with his battery was returned to the special shell shock hospital suffering from general tremor. When asked what he complained of, he stated that his "nerves were broken," that he was not strong enough to stand the life. When asked if he had been afraid he asserted rather violently he had not—he had never been afraid of any man. When it is explained to him that his nerves could not be broken, that he really meant that he had lost control of himself, he asserted that he was not strong enough to stand the life owing to the fact that he had heart disease and that if he had been examined by the medical officer he would not have been sent to the front on that account. Examination of the heart showed it perfectly normal and on being assured of this, he stated that in any case he had done "his bit" and he should not have to go back to the front. He had done fourteen months' duty on the coast defense in England, and he had taken on this position in the early days when there was little or no protection and he had been exposed to all sorts of weather and hardships. When he received the assurance that we did not criticize anybody for being afraid, that it was a very natural phenomenon, he then admitted that he did have his "wind up" and in fact he had been very much afraid.

COMMENT

If one analyzes this case one sees the natural reaction of the mind in suppressing the unpleasant truth that he is afraid. He violently asserted that he was not afraid of any man. One sees also another natural reaction on the mind in defending the individual to himself. His first defense was that owing to heart disease he was not physically strong enough and when that was put out of court, his second defense was that he had already done "his bit" and that he should not be called on to go the front. When it was pointed out that it was hardly just to compare fourteen months on the coast defense in England with fourteen months in the front line, as many of his fellows in the battery have done, he rationalized his whole condition and was in a position to appreciate the injustice of leaving other men to do his share who, though just as much afraid as he was, were controlling their emotions effectively.

One will appreciate that in order to make an individual thus rationalize his ideas and then appeal to his higher control, one takes for granted that he is a man of average amount of intelligence. In the case of the feebleminded, such a method is hopeless.

When one realizes the numberless sources of suggestion, one can appreciate how protean may become the character of the symptoms.

TREATMENT

In the treatment of these cases a thorough knowledge and examination of the nervous system is necessary to exclude any organic disease. With the assurance that there is no organic disease present, a broad human charity and a personal interest in the explanation of the individual symptoms are essential. The patient must be made to understand the causative factor played by the primitive emotions and he must be made to rationalize the ideas which have been set up. In this way his discipline, his self-respect, his higher control can be called on to take command again. Involved psycho-analysis according to the freudian idea is, in my opinion, a waste of time and unnecessary.

Certain of these psychogenetic cases I just naturally treated with military sternness, and without much apparent sympathy, simply making them do what they said they could not do, but for which, of course, I knew there was no organic cause to prevent them. Others, I took sympathetically and led them along with reason, persuasion and encouragement. When asked why I made the distinction, I could only answer, at first, that my experience had taught me which was the way to take them. As a rule, whichever method I used, worked well. Realizing there must be some underlying reason for the difference in methods, I was led to the following plan, after reading William McDougall's "Social Psychology."

RATIONALE OF METHODS OF TREATMENT

We have noticed in all these genuine psychogenetic hysteric or pithiatic conditions there is a greatly increased suggestibility which has been produced as a result of the terror under which they have labored. McDougall, in discussing the emotions of admiration and awe, shows that under the influence of either there is an increased suggestibility. In analyzing these emotions he shows that admiration is made up of wonder, plus what he terms a negative self-feeling—a feeling that we are in the presence of a superior power, something greater than ourselves. Certainly we are all in a more suggestible state of mind toward one whom we admire than toward one whom we do not, and we are more likely to be influenced by his words or actions.

In the same way in his analysis of the emotion, "awe," he shows it to be made up of a negative self-feeling, plus wonder, plus a suspicion of fear. Under the influence of "awe" we are more suggestible.

Terror, on analysis, is made up of fear with a much exaggerated negative self-feeling element, and here, too, we have found the increased sensibility.

In all three emotions we have found the resultant increased suggestibility and the only common factor, on the other side of the equations is the negative self-feeling. Therefore, the negative self-feeling must be the cause of the increased suggestibility. When, therefore, I see a man with a psychogenetic disability who is unreasonably antagonistic, self-assertive and inclined to be impudent, I realize that that man has not the negative self-feeling one expects to find in a genuine case and I feel he is more of the malingering type and trying to deceive me, which one naturally does not knowingly permit. Not only that, but to treat these cases efficiently, it is necessary to inspire that necessary negative self-feeling and the consequent increased suggestibility essential in these cases to a rapid recovery. From this one can estimate, also, the harmful effect of unrestrained emotional sympathy toward these patients. Its tendency will be to produce a positive self-feeling which will render attempts at treatment in many cases futile.

TREATMENT BY SUGGESTION

Any methods of suggestion are insufficient, simply diverting as they do the patient's ideas. Hypnotism, which is merely induced hysteria, cannot reasonably be expected to cure; it is granted that by this means the symptoms can often be relieved; it is, however, by superinducing a further condition of hysteria, and the probability is relapse on the first moment of strain and emotion. His condition and disability depending entirely on ideas, cannot be influenced except superficially by drugs or mechanical treatment. Reason is the only thing that will appeal to or change ideas.

If functional paralysis of a limb be present, it is a simple thing to show him by means of a strong electric current suddenly applied, that he has voluntary power in the limb; once having seen this he will call on it. In the same way the voice can be shown to be unaltered. In case of tremor, once the real origin of the trouble is accepted by him, if the patient is pursuaded to relax the muscles, the tremor ceases. One always notices that these patients, when endeavoring to control the tremor, put all their muscles tense, which simply serves to increase it.

When a patient is diagnosed as psychogenetic, one should use equally scientific rational methods with him as one would in the case of any bacterial infection. If the patient comes complaining of loss of appetite and, on examination, one finds he has typhoid fever, one does not treat the loss of appetite. One tells him frankly he has

typhoid fever and gives him treatment which has been recognized as reasonable and proper from a knowledge of the pathology of the disease.

If a man complains of a pain in his back and after the most thorough examination we can find no organic disease, we designate it as a neurosis, that is, it is mental in origin. Surely it is not the part of science to give him a plaster jacket. Such action will simply impress on the patient still more deeply the idea that he has an organic lesion and make it more difficult to eradicate.

FINAL DISPOSAL OF THESE CASES

It is evident that the final disposal of the man and his expectation as to pension will have a decided influence on his condition. If by his disability he is going to escape future danger, and is going to receive a more or less satisfying pension, and his future is going to be cared for without any work on his part, he has small inducement offered to him to make the effort to use his higher control. In the French army this has been recognized, and their ruling now is that hysterical disabilities will warrant no pension, no gratuity, and no discharge from the army; that where a definite wound is associated with hysterical disability the latter must not be considered in estimating his pensionable disability and in no case does such functional disability warrant discharge from the army. The result of the putting into practice of this legislation is that it is not worth while to develop shell shock in the French army.

In England, on the other hand, a very different state of affairs existed, and it is only recently that efficient methods have been adopted to treat these cases in special hospitals. Previous to that many were discharged to civil life with a fairly big pension. It was a common experience that even in civil life many of these were inefficient.

Sitting on the special medical board which dealt with these cases, one would see men who had been discharged some months to their own control, who had again become total disabilities. Let me quote two typical cases:

One man had been discharged from the hospital to return to his command depot. On the train while leaning out of the window an engine in the neighborhood whistled. He immediately fell back in the compartment, shaking all over and was returned to the hospital a complete disability.

Another patient who had been discharged to civil life and had been carrying on for some months, while in Paddington station one day there was an air raid warning. Everybody moved toward the underground, this man with the others. An engine in the station whistled; in his own words, he fell down in a severe hysterical convulsion. Somebody threw him into a baggage car and

the train ran out of the station. Its first stop was at Taplow, and he was taken off and sent to the hospital there. When seen, he was walking with crutches, dragging his legs behind him.

In neither of these cases was there any sign of organic disease found. They had been startled by an idea and had lost control of themselves. Being a pensioner, this latter patient would be advised to go to the first home of recovery, a fine old house in beautiful grounds with a fine billiard table and interesting occupation found for the patients. While there he would be receiving 27s. 6d. a week, with 13s. for his wife and so much for each of his children. He would live there for six weeks or two months like a gentleman of means, well cared for and well fed, and with an interesting occupation. At the end of that time, if sufficiently recovered, he would come to the special medical board and might well receive an increase to his pension on account of his nervous instability. Now we saw in the first place that his condition was due to an idea, and we must realize that only reason will appeal to an idea. If all the reasons that are being given a man are such as to encourage him in his condition, it is hopeless to expect that his ideas will be influenced beneficially.

In dealing with this type of case in Canada, we are following the plans which have been adopted in the French army and in the British army in France. We have special hospitals where these patients are segregated immediately on their arrival. These centers are under the supervision of specially trained men who see (1) that no patient showing gross objective functional disturbance shall in the future be discharged from the army; (2) that such psychogenetic condition shall not warrant any pension or gratuity, and (3) in the event of such patients relapsing in their condition after their discharge from the army, they shall be returned to the special neurologic center from which they were discharged.

PSYCHASTHENIA

In psychasthenics, when prewar disability can be demonstrated — and Captain Farrar states it can be in 90 per cent. of the cases — it should, by appropriate treatment, be reduced to as near the prewar disability as possible, and they should be discharged without pension or with pension covering the estimated amount of the aggravation.

With the carrying out of these recommendations, one could justifiably hope for (1) the return of a greater number to military duty; (2) a greater efficiency in civilian occupation in those discharged to their own control, and (3) a very decided diminution in the amount of pension.

FEEBLEMINDEDNESS

With regard to the feebleminded to whom we have made reference. One recognizes that this condition of mental deficiency was not induced nor aggravated by military service in the great majority of cases. In what way should they be disposed of? When discharged, many of this type drift back to the hospital for a while at least, usually on insufficient medical grounds. While we recognize that this disability does not warrant a pension, it is my opinion that from a national economic point of view, the state should become the guardians of such individuals. They should be collected into colonies where they might be made partially self-supporting at least, under supervision; otherwise they will become the tramps, ne'er-do-wells and criminal class always so greatly augmented in the train of war.

THE HISTOGENESIS OF MULTIPLE SCLEROSIS*

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Multiple sclerosis has steadily held the attention of the investigators for a number of decades, and the careful clinical study of the disease in connection with exhaustive histopathologic research has resulted in a number of theories on the basis of which the more recent histologic studies have given gratifying results.

The newer methods of staining and modifications of the older ones made it possible to differentiate more definitely the tissue elements which enter into the pathologic process and in consequence of this, these have been minutely described. However, it is evident in the conclusions drawn from the results which have been revealed that the interpretation of the tissue changes and their correlation, not only from a histopathologic standpoint, but also in connection with the reaction of certain tissue elements under abnormal conditions and the reaction of a feeble biogenetic balance in the tissue as a whole, is incomplete and the conclusions indefinite. This fact warrants not only a recapitulation, but also establishes a basis for further attempts to correlate the pathologic changes which have caused the structural disorganization in the various parts of the nervous system with the physiologic changes. Further, the careful description of the elements and the changes occurring in them has made it possible to trace the origin of the disease to the embryonic stage.

The basis of this investigation rests on four cases of multiple sclerosis; one of these the writer studied clinically as well; the other three and later the fourth were patients at the state hospitals for the insane where the clinical notes and necropsy protocols were made.

All of the cases were under observation for considerable periods of time and presented sufficient clinical evidence for a positive diagnosis. For lack of space the case histories and clinical notes are omitted from the article, but these will appear in full in the reprints.

CASE 309.—*Necropsy*—Many of the bronchial glands were enlarged. The glands of the small intestines were found enlarged and, on section, showed cystic change with an abundance of yellow gelatinous substance exuding. The heart weighed 260 gm. The endocardium showed no marked localized change and there was no myocardial change. The kidneys showed only such changes

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* From the laboratory of the State Psychopathic Hospital.

as those caused by the terminal disease. The liver and spleen showed nothing of interest.

The Brain: The brain weight is 1,270 gm. The pia-arachnoid is cloudy, the subarachnoid space contains considerable fluid, the convolutions are everywhere small and somewhat atrophied, most marked in the frontal and parietal regions. In that position of the supramarginal gyrus, bordering on the Sylvian fissure, there is an area semitranslucent in appearance, of rather firm consistency. A long section passing through the temporal lobe, shows extreme atrophy of the cortex. It is very narrow and the contrast with the underlying white substance is diminished. The convolutions in other parts surrounding this area are widely separated. The gray cortex is unusually dark. The white substance in the center of the hemisphere shows considerable narrowing. A long section passing through the red nuclei shows a surface with extreme congestion of the blood vessels particularly marked in the region of the basal ganglia. There is also the same general atrophy apparent that was observed in the other part of the brain. The basilar vessels are free from sclerosis.

In various parts of the brain there are sharply circumscribed, reddish-gray or grayish-white areas varying greatly in size and shape. In consistency they are more firm than the surrounding tissue and stand out prominently, there being a marked contrast between these areas and the background of apparently normal brain tissue.

Case 302.—*Necropsy.*—On section of the left lung several small tubercles were found in the upper lobe and there was an area of consolidation in the lower lobe of the left lung. At the apex of the right lung there was a caseated tubercle about the size of a pea. In the lower lobe there was also some consolidation. In the cortex of the right kidney there was a small cavity containing about 2 c.c. of yellow fluid. The spleen showed considerable congestion throughout with atrophy and cloudy swelling.

The Brain: In opening the cranial cavity it was found that the dura mater was adherent to the calvarium. A considerable amount of clear fluid escaped on cutting the dura.

The pia and arachnoid were cloudy. The vessels of the pia were deeply congested. The basilar vessels were atrophied but showed no sclerosis. The brain weighed 1,336 gm., its consistency was slightly diminished, the surface was smooth and the convolutions slightly separated at their tips and a slight degree of atrophy was apparent in the brain tissue about the central longitudinal fissure. The brain was hardened in 10 per cent. formalin. A longitudinal section passing through the middle thalamus shows a narrowing of the white substance of the center of the convolutions, especially in the frontal regions. The central white area of the right occipital-temporal region that borders on the right posterior horn is strikingly different from the left. The central white area on the right side appears to have an uneven cut surface and has dark grayish streaks and blotches leaving very little of the white appearance of the normal tissue. Anteriorly it extends to the posterior border of the insula and posteriorly to the occipital region, leaving only a small tip bordering on the occipital gray free. The lesion extends into the central substance of the second temporal and a little into the third temporal convolution. The consistency of the changed area is firm and cuts with increased resistance. The lateral ventricles appear widened. There are other smaller sharply circumscribed areas in various parts of the brain of the same appearance and consistency.

CASE 412.—*Necropsy.*—In the apex of the left lung there were old adhesions found. The right lung was not unusual. There was an increased amount of fat about the heart, the heart muscles were flabby, soft and thin. The endocardium was not noticeably changed. The stomach and intestines showed no pathologic change. The liver was large. In the lower border of the left lobe there was a circumscribed nodule about one-half inch in diameter, of a dark blue color. The cut surface of this portion was yellowish-brown and in the center a small cavity containing a small amount of fluid. The spleen was soft but was normal in size. The cut surface was pale red in color and the pulp was soft and easily compressed. The connective tissue was increased. In the kidneys there was nothing unusual.

The Brain: The brain membranes were thickened. The dura mater was slightly adherent. The pia was cloudy especially over the frontal lobes and over the cerebellum. The weight of the brain was 34½ ounces without the meninges. The cranial nerves showed no gross changes. The vessels of the base of the brain were not sclerosed. The convolutions were small and pitted. The sulci were rather wide and flowing. There were several small depressions, as though from atrophy, near the median portion of the frontal lobes. The spinal cord appeared normal, on section the surface was not characteristic. After hardening the brain in 10 per cent. formalin it appeared symmetrical. The pia mater was slightly thickened and ôpaque over the extreme convexity. The consistency of the brain was firmer than usual. The convolutions in all regions showed great atrophy, most marked over the frontal and central regions.

Longitudinal sections of the brain 1.7 cm. in thickness, show in all regions, in both gray and white substances, spots which are somewhat translucent in appearance of a grayish or reddish-gray color; these vary from 1 to 2.5 cm. and are well circumscribed. The largest are found in the white substance. In the region of the thalamus both optic radiations are involved and small patches are found in the thalamus. The caudate and lenticular nuclei contained numerous small plaques. The right posterior limb of the internal capsule from the knee back to its posterior third is sclerosed. There are sclerotic patches in the corpus callosum and in the external capsule. In the posterior quadrigeminal regions a dense white spot is seen above the median fillet. The pyramidal bundles on the left side look grayish and show involvement. Gray spots are seen in the middle of the pons and in the cresta. The upper surface of the optic chiasm is rather gray and translucent in appearance. The cranial nerves appear normal. The cerebellum shows no involvement. The vessels at the base of the brain are about normal in appearance.

The various spinal cord segments show sclerotic patches in both white and gray substance.

CASE 986.—*Postmortem Examination.*—The patient died at 8 a. m., March 24, 1915. The postmortem was held at 10 a. m. of the same day.

The body of a greatly emaciated middle-aged white woman. Body heat present. Beginning rigor mortis in limbs. Hypostatic congestion over back and buttocks. Postmortem lividity over the left arm. Third and fourth fingers of the left hand contracted at the second joint on palm. Extreme extension of the big toes, most marked on the left. Hair on scalp and pubic regions brown, abundant.

Panniculus almost nil, deep yellow, dry. Muscular tissue greatly wasted, deep red, dry.

Pleura: On the left side it is free; pleura over the right shows dense adhesions over the entire lung, which separate with difficulty.

Left Lung: Weight, 310 gm. Rather large amount of purulent material poured from the left pulmonary bronchus on the removal of the lung. Upper lobe gray in color, moderate anthracosis, fairly collapsed. Lower lobe enlarged over posterior surface, purplish blue color, tough, airless. Anterior surface of lower lobe comparatively negative. Section over posterior enlarged portion shows lung tissue tough, moist, pits on pressure, frothy bloody fluid oozes forth. Section of the lung in the upper region shows the tissue negative.

Right Lung: Weight, 375 gm. So densely bound by pleural adhesions it is necessary to dissect it out. Upper lobe mottled gray color. Pleura is roughened and shaggy from torn adhesions. Middle lobe pale gray in color, pleura rough and shaggy from torn adhesions. Both lobes are moderately crepitant. Lower lobe is somewhat enlarged, mottled red and purple color, markedly crepitant. On section in the lower lobe the tissues are seen exceedingly moist, pit on pressure, tough, glistening and frothy pale serum streams forth on squeezing. Section of the upper and middle lobes shows them negative.

Heart: Weight, 285 gm. Pericardium thin, rather large amount of clear, straw-colored pericardial fluid. Heart small in size, filled with fluid blood, moderate amount of fat over the right heart. Walls of the left ventricle are moderately thick and fairly negative. Some uneven thickening of one leaflet of the mitral valve, moderate in degree. Valve of the aorta negative. One large patch of sclerosis immediately above one leaflet of the aorta valve, few small patches in other regions. Two of the leaflets of the tricuspid valve show a rather marked thickening. Walls of the right ventricle negative. Pulmonary valve negative.

Liver: Weight, 1,085 gm. Dark red color, surface smooth. Capsule markedly thickened over anterior surface. Walls of the gallbladder considerably thickened, otherwise negative. Liver sections with comparative ease, shows a distinct yellow mottling, is markedly congested, otherwise negative.

Stomach: The stomach is somewhat dilated, unusually elongated, walls are negative. Marked congestion of the mesenteric vessels, moderate enlargement of the mesenteric glands throughout the entire small intestines, most marked in the upper portion. Small intestines negative. Appendix closely bound by its mesentery back of the cecum. Large intestines negative. Abdominal aorta negative.

Uterus: Comparatively negative. Right ovary is greatly enlarged and cystic, tube negative. Left ovary moderately enlarged, beginning cystic degeneration, tube negative. Bladder collapsed, negative.

Spleen: Weight, 80 gm. Spleen capsule negative. Spleen sections with some increase in resistance, shows rather diffuse increase in connective tissue.

Left Kidney: Weight, 90 gm. Very little perirenal fat. Kidney normal in position. Ureter patulous. Capsule thickened, shows a few small cysts beneath it, strips with some difficulty leaving a finely granular surface. Kidney sections with some increase in resistance, shows narrrowing of the cortical substance, uneven in character. Pyramids are white and fibrous in appearance. Pelvis is enlarged.

Right Kidney: Weight, 110 gm. Normal in position. Perirenal fat nil. Ureter patulous. Capsule is thickened, strips leaving a very finely granular surface. Kidney sections with increase in resistance, shows some uneven

narrowing of the cortex. Pyramids are fibrous in character. Pelvis is enlarged.

Pancreas: Negative.

The Brain: Weight, 1,060 gm. Calvarium unusually thick in all regions, thickening is greater over the left half, very heavy in weight. Dura is thickened and densely adherent to the calvarium making it necessary to dissect out the brain. Congestion of the superior and lateral longitudinal sinuses. Pia of the convexity is markedly edematous over the extreme convexity especially in the right hemisphere, it is much thickened but to a lesser extent over the base. Convolutions of the convexity show a rather marked flaring of summits and widening of sulci in the frontal, superior central, and parietal regions, most marked on the right. Brain tissue is unusually soft, flattens out of its own weight. Unusually large amount of cerebrospinal fluid. Pia of the base is slightly hazy in cisternal regions and inferior surface of the cerebellum. Convolutions of the base show rather marked widening of sulci with marked flaring of summits in the temporal tips. Basal vessels are thin and negative. Cranial nerves are unusually small. Brain tissues are so soft that blocks of material were taken with difficulty.

Cord was removed; aside from extreme congestion it showed nothing else of note.

As an established routine in the State Hospital for the insane, small blocks of fresh tissue were removed from the various regions of the cerebral cortex and other parts of the brain as well as from the spinal cord and placed in 96 per cent. alcohol, Müller's fluid, Zenker's fluid, and 10 per cent. formalin. The brain as a whole and the spinal cord are placed in 10 per cent. formalin.

When the tissues were received at the laboratory of the State Psychopathic Hospital the brain weight was 1,058 gm. The longitudinal diameters of the left and right hemispheres were 15.5 cm. The transverse diameters were 12.5 cm. The pia matter of the convexity was somewhat thickened, this was more marked in certain areas but this apparently had no definite relationship to any other structure as far as one could observe with the naked eye. The thickened areas were irrregularly distributed and of variable size and not well defined. At the base, the changes in the pia were less marked. The arteries at the base showed some atheromatous patches. The sulci over a large portion of the convexity were deepened and widened. The horizontal sections of the cerebral hemispheres at various levels showed no areas of sclerosis or abnormal variations in color. Both the cortex and subcortical white matter and the basal ganglia were free from any pathologic process which could be recognized by the unaided eye. The lateral ventricles were enlarged but their surfaces were smooth. In sections through the pons at different levels the tissue appeared normal. The floor of the fourth showed no lesion. In some of the sections of the spinal cord, especially the cervical region, the contrast between the white and gray matter was lacking and there were more or less distinct variations in the color in both the white and gray substance. The tissue surrounding the larger vessels in the central gray substance of the cord showed a contrast which made these vessels stand out prominently. A similar contrast was noticed in the posterior root zones and on one side in the anterior root zone which extended to the margin of the cord posteriorly and some distance inward on the inner side of the gray horns.

HISTOGENESIS

It will be noticed that the serologic examination of the cases reported is incomplete, but many sections of the tissue were examined by the Levaditi silver method for the *Spirocheta pallida* which failed to show this organism. All of the tissue from the four cases which was examined revealed, in general, a uniform histopathology.

Microscopically, one recognizes in the Weigert preparations numerous demyelinated areas of varying size mostly oval or circular and definitely isolated in the brain; more often were the areas in the spinal cord coalesced. These were all much larger and more irregular than any of the areas observed in the brain except those situated in the central gray matter and in the extramedullary nerve root zones. Here the areas were well isolated and stood out prominently. In both the anterior and posterior extramedullary nerve roots similar well defined areas proved to be of special interest owing to their varied structure and characteristic architecture. The topographic distribution of the areas shows little difference in the cases under consideration, though the extent of the process varied greatly in the different cases. In the brain of one of the patients the optic radiations of the left side showed the largest number of sclerosed areas.

The areas were well isolated and could be traced through its entire length. In the same case the ependymal lining of the posterior horn of the left lateral ventricle showed a marked granular ependymitis. The toluidin blue preparations gave a striking picture which made it possible to quickly recognize and differentiate the areas by the prominent nucleated zones. Of these areas certain of them have two, others three well defined circular nucleated zones, one involving the central blood vessel, another the perivascular area and still another the tissue surrounding the demyelinated area. In the areas where but two nucleated zones are in evidence the adventitial tissue contains numerous nuclei arranged in a circular manner indicating the inner zone while the neuroglia tissue surrounding the area has an increased number of nuclei forming the outer zone.

The nuclei belong to a variety of cells which vary in the different areas. In the area presenting three definite zones they are the constituents of fat granule cells and large and small neuroglia elements. There are also other mononuclear and polynuclear cells of various types.

In the two zone areas they are the nuclear elements of large mononuclear and polynuclear neuroglia cells and smaller neuroglia, and the nuclei of an embryonic cell type. There are other nucleated areas which present a uniform structure throughout in which the elements are of one type in various stages of development. They have no definite arrangement but lie within the vessel wall.

In the van Gieson and Mallory phosphotungstic acid hematoxylin preparation the fiber structure of the areas presents a variable picture. In the areas that have three zones the newly formed fibers have a reticular arrangement, while in the areas that present but two zones, the neuroglia fibers in the inner zone appear as undulating trabeculae concentrically arranged, while those of the outer zone are reticulated with finer fibrils in the meshwork.

In the third type the fiber structure is arranged in circles and whirls, they lie in bundles and stain a deep blue in the van Gieson and Mallory preparations. This type is further differentiated from the other two in that they occur in the spinal cord and in the nerve roots only.

The toluidin blue preparations show the changes in the nerve cells as those of axonal reaction, acute swelling and simple atrophy. These variations are not isolated with the variations of the types of areas although certain changes in the nerve cells predominate in the different areas, so that the areas having three zones show a greater number of cells having an avoid form with a granular cytoplasm and a somewhat eccentric nucleus, while those having but two zones, the nerve cells in the surrounding issue show more frequently a narrowing of the body with an eccentric nucleus and displaced chromatin. Many of the cells in all of the areas are normal in appearance.

It is evident that some of the different areas may be regarded as stages in the evolution of the sclerotic plaques, but it is also equally certain that other areas cannot be transformed into the characteristic lesion of the disease.

This study is largely an attempt to group the different areas on a cytoarchitectonic basis and to correlate the groups into a process as a whole. No effort is made to cover the subject in general which has been so admirably done by others, especially of late by Dawson.[1]

Therefore, it will be necessary to describe in detail the different areas in the endeavor to place them properly in the evolutionary stages according to their elementary constituents and then to group them accordingly on an embryogenetic basis.

The shape of the demyelinated areas as brought out by the Weigert myelin sheath stain is usually oval or irregularly round, and is more or less sharply defined from the surrounding tissue. In the majority of the areas the lumen of one or more blood vessels is in evidence. The blood vessel wall appears in various stages of disintegration with a proportionate cell infiltration in the remaining connective tissue meshes and a cell proliferation in the vicinity of the vessel and near the outer border of the demyelinated area. Other vessels show well

1. Dawson, J. W.: Rev. Neurol. and Psychiat., **15**:47 and **16**: No. 12, 1917.

preserved or thickened walls. In the Weigert preparations there are great variations in the color of these areas, some retain no myelin sheath stain, others are faintly but uniformly stained, while others are irregularly stained, which is due to various stages of myelin disintegration. In the van Gieson preparations it is apparent that the cellular elements, their arrangement, and the changes within them vary with the staining qualities shown in the Weigert preparation. The silver impregnation method gives evidence that the axis cylinders have been retained within areas where the myelin sheath is absent, but are not so well defined and there are greater variations in size and shape as well as in position. Some of the areas in the Marchi preparation show no black staining, characteristic of degenerating myelin nor is there evidence of fat granule cells in the Herxheimer preparations, while in other areas there are numerous fat granule cells filled with well stained irregular granules. Bordering the sclerotic area, interposed between it and the normal tissue, are numerous nuclei of small and large glia cells, some of which show pronounced glia trabeculae. The glia tissue has a reticular arrangement in some of the areas, in others the fibrils radiate almost perpendicularly to the vessel wall apparently having their origin from the cells situated in the tissue spaces.

The variations in the cellular elements of the demyelinating areas are best shown in the toluidin blue and original Nissl preparations. The former give excellent pictures of nuclear and cellular structure in the various stages of development.

The most striking features in such areas are the variations in the cells which enter into the process. In some of the areas there are numerous, regularly placed, large, protoplasmic glia cells encircling or nearly so, the apparently normal vessel wall. These cells lie in the perivascular neuroglia tissue and in the adventitial wall. The lumen of the vessel is dilated, and either empty or containing a few red blood cells and an occasional leukocyte. In other areas, here and there are irregularly scattered, in the various layers of the vessel wall, cells of the same type but showing well marked variations in the cytoplasm and in the nuclear structure.

In the adventitia one observes an increase of nucleated elements which are mostly small, round and deeply stained nuclei with a small amount of protoplasm. Occasionally a few round vacuolated cells with a central or peripherally placed nucleus are present; these are absent in many of the areas. In the perivascular tissue, in the adventitia, and in the media of the larger vessels, but especially in the adventitia of the capillaries and precapillary vessels there are, among the other cells, single or in groups, large cells with a homogeneous

cell body, their nucleus is large and vesicular with a definite membrane and one or more deeply stained nucleoli. The position of the nucleus is central though sometimes eccentric, and they may be multinucleated. Some of the cells show bilateral indentations and even lines of division giving the appearance of a just completed cell division (Plate III, Fig. II—18). Among these cells there are still larger ones with large protoplasmic processes which penetrate the adventitia of the vessels. In some areas these cells are absent. Here and there in some of the sections one observes dilated capillaries, precapillary vessels or branches of larger vessels which are surrounded by the large protoplasmic cells showing great variations in structure, form and staining qualities. These are apparently representative of the various stages of the development which result in the formation of glia fibers. In the same section, various areas present different degrees of this form of gliosis.

It is apparent in many areas that there is a gradual disintegration of the blood vessel walls which seems to be in proportion to the gliosis and which extends from the periphery, as in some areas there is but an outline of the intima visible. At the periphery of the more or less demyelinated areas there is a proliferation of nucleated elements which are mostly small, round, deeply stained nuclei with a small amount of protoplasm surrounding them. Among them, here and there, is an occasional fat granule cell. These areas show all stages of myelin degeneration. In some of them the demyelinization is well advanced in the immediate vicinity of the small central vessel, while at the outer margin there is an irregular loss of the myelin and the process appears as though it extended from the center, concentrically peripheralward.

The vessel wall in some of the areas shows an increase of nuclei and an increase in its fiber density. The processes of the large protoplasmic glia cells have a tendency to follow the course of the fiber trabeculae of the vessel wall; some of them, however, seem to extend gradually in a perpendicular plane toward the lumen of the vessel which stands out prominently in the Mallory anilin blue acid fuchsin preparations. The color contrast is striking and the picture presents bundles of undulating fibers encircling the lumen of the vessel. Between the blue fiber bundles are wide spaces in which appear numerous pink fibers of varying size, some of which follow closely the circular course of the blue fiber bundles, while others run in all directions, and the finer and coarser fibers are closely intermingled (Plate I, Fig. IV). The variations in this differentiation are marked. In some of the vessels the pink stained fibrils predominate, while in others there is a dense blue circular band with but few, fine, pink fibrils

with a small lumen in the center. In other vessels no trace of blue fibers is in evidence, and but few nucleated elements are apparent. The lumen is nearly obliterated and in some vessels beyond recognition.

It is evident from the final results, as shown by the differential stains, that all of these variations are not the products of the same process. In the one the ectodermal, in the others the mesodermal tissue, alone is represented at the terminal stage.

The microscopic pictures of the cellular elements are most varied. There is the simple lymphocyte-like undifferentiated cell type which occurs in the tissue spaces of the capillary, the precapillary and the larger vessels (Plates III and IV—17). This cell is not found in the nerve tissue outside of the perivascular lymph spaces. It was not found in any pathologic condition of the nervous system after studying a large number of preparations of varied conditions. In the glioma there occurs a similar cell; in fact, almost identical except for size. Not any of these cells were as large and regularly formed as the type which will be described presently.

In the toluidin blue preparations (Plate III, Figs. II, III and IV—17), the cell is large, round, sometimes slightly ovoid or irregularly round with a large, round, central nucleus which is of a light blue color usually uniformly stained with a definite nuclear membrane. The cytoplasm is homogeneous, sharply circumscribed and nearly colorless, there is usually the slightest tint of purplish-gray in the cell body. This type occurs single very rarely, two are seen in close proximity. There are from two to five in one area. In longitudinal section they are placed a considerable distance apart, often they are observed where a branch joins the main trunk of a vessel. They are present in the areas marked by the absence of fat granule cells and rarely were they found in areas with a large number of fat granule cells. The distribution of these cells covers the brain, spinal cord and nerve roots, and always in connection with the sclerotic process.

The cells are easily differentiated from the other cell types, especially the lymphocytes, because of the regular size and form of the cell body and the nucleus, the uniform stain of the nucleus and its light blue color and the pale bluish-gray cytoplasm, though some of the cell bodies remain unstained. This type of cell will hereafter be spoken of as *"the undifferentiated cell."*

In the same preparations and in the same area there are round and ovoid cells with crenate nuclei which are deeply stained and in which a definite membrane can be distinguished. The cytoplasm takes on a deep purple color. Other cells are rather long, ellipsoid bodies, the nucleus of the same shape which is outlined by a fine granular

border which stains deeply blue and the protoplasm purple, and it occupies a central position. Some cells of this type show bilateral indentations in the nucleus, others show the same process in the cell body, and from this form it is possible to trace them to complete division resulting in two large, round cells with a large nucleus which is marked by a finely granular border and homogeneous protoplasm. The cell body is uniformly stained a pale purple. Similar cells show deeply stained, irregular granules in the peripheral cytoplasm which in some of the cells have very fine striations proceeding from them. In other cells the striations are stained more definitely and can be made out as bundles of fine fibrils, and from this type the successive stages in the formation of the large protoplasmic pathologic spider cells can be traced. In either the van Gieson or toluidin blue preparations large *epithelioid cells* are a prominent feature. At first these cells are few, they lie isolated in the adventitial tissue as small, round or ovoid bodies, the nucleus proportionately large with a small amount of cytoplasm surrounding it, but in other areas they are more variable in size and greater in number. In such areas they appear as large central or eccentric nuclei containing a large amount of chromatin which is deeply stained. The changes in the nucleus and the increase in the protoplasm in these cells can be traced until large round cells are formed. From such cells all the stages of development to the fully formed *fat granule cell* are in evidence in the areas where this process predominates. In such areas the nuclei that undergo these rapid changes lie within the vessel wall while those in the perivascular lymph spaces are well formed fat granule cells; further, many areas show the presence of these cells without any marked change in the nuclei of the neuroglia elements. The fat granule cells are found only within the lymph spaces and the vessel wall.

The increase of the nucleated elements within the vessel wall is of several types: In the adventitia occur large, round nuclei with a clear, chromatic framework, surrounded by a round or irregularly round protoplasm of more or less granular structure. These are endothelial cells from the lymph spaces. Other forms of the adventitial cells have darker eccentric nuclei with ovoid cell bodies which show more or less stained substance which probably arises from the connective tissue elements of the adventitia. Aside from these there are fibroblasts, mast cells and a few plasma cells situated within this layer.

The increase of nucleated elements in the tissue surrounding the areas of demyelination is dependent on a number of cell types; there are large nuclei with a clear and regular chromatin structure with a considerable amount of deeply stained protoplasm around the nucleus; other cells show a branching of the protoplasm, and there are forms of

varying size and shape, many of which are multinucleated. In some of the mononuclear cells there are prominent granules arranged in two half circles which almost meet. The protoplasmic processes show fine striations which in other cells prove to be a fibril formation. Some of the cells seem to undergo regressive changes, they appear narrow, having an irregular border frequently in contact with the nucleus laterally; some of these narrow elongated bodies have no nuclei.

EXTENSIVE ELEMENTARY CHANGES OCCUR

From the foregoing it is evident that widespread elementary changes take place, the character of which indicates in part a disturbance of their interrelationship and in part a primary new formation.

In a closer consideration of the different preparations presenting various color pictures and different planes of demyelinated areas one is constantly reminded of the two principal types.

Some of the areas consist largely of numerous fat granule cells surrounding a central engorged or thrombosed vessel with a marked nuclear infiltration of its wall. The myelinated fibers show all stages of degeneration. The nonmyelinated area has a loose meshwork surrounding it, in the spaces of which are fat granule cells with interposed proliferating glia elements. In some of the areas the zone in the immediate vicinity of the blood vessel shows the spaces of the fenestrated structure clear, while in the peripheral portions the fat granule cells remain. This dissolving out of the degenerated myelin and destruction of the cells may occur during the process of preparation, but it is evident that there is a difference in the appearance of the granules in the different stages of disintegration from the variation in the stain, these areas give the appearance of changes found in acute myelitis and are properly termed areas of "fat granule cell myelitis." The axis cylinders are markedly altered in that they are swollen and show great variation in size and staining qualities. In longitudinal sections they are very irregular, and with elective axis cylinder stains (Cajal's and Bielschowsky's methods), they appear, here and there, as finer and larger vesicular granules, and as rows of segments of irregular contour and clumps amidst long rows of fat granule cells which seem to occupy the spaces left by the disappearance of the myelin. Rows of these cells fill the blood vessel sheaths which in cross-sections and under low magnification appear as concentric rings around the blood vessels. The fat granule cells are best differentiated in the sections stained with Scharlach R and hematoxylin. They vary greatly in number in the different areas. There are but few in some areas where the demyelination is advanced and the normal tissue has been replaced by an overgrowth of neuroglia fibers. Closely

related to the foregoing are the areas in which there is an exudate into the tissues surrounding the vessel and into the vessel wall, consisting largely of mononuclear elements and a few red blood cells. This exudate causes a separation of the tissue fibers in the vessel wall and in the tissue surrounding it forming spaces which are filled with elements of the exudate. In many capillaries and precapillary vessels, the endothelial cells have proliferated causing an irregular projection in the lumen of the vessel, and at some of these points there are collections of polymorphonuclear cells which probably represent the beginning of thrombus formation. In a longitudinal section of one of these vessels it appears that the vessel wall is wavy, apparently from unequal resistance in the vessel wall and the surrounding tissue. Here and there are bilateral indentations of the vessel wall which in some places are connected by thin fiber bands containing both mononuclear and polymorphonuclear elements with an accumulation of red blood cells. A marked reaction in the tissue surrounding the area is evident in the increase of the nucleated elements. Fat granule cells and fiber-forming neuroglia elements are in abundance. The Herxheimer fat stain shows the presence of a large number of fat granule cells filled with red stained clumps and granules.

In sections of the spinal cord a number of areas stood out prominently which appeared at irregular distances from each other, following the course of the posterior root fibers. They not only occur here, but also in the central gray matter. In structure, they differ from any of the areas described in the foregoing, which under higher magnification become at once evident in the staining quality and the architecture in general. A number of these areas were easily differentiated on the posterior and the anterior nerve roots, and in the respective root zones. In the region of these areas the extramedullary posterior root in cross and longitudinal sections show a double structure which divides it into two unequal parts, with an abrupt line of demarkation caused by a difference in the staining of the structures (Plate V, Fig. II—31 and 32). The portion lying nearest to the spinal cord shows a fibrous structure containing large, well stained elongated nuclei with blurred ends and with their long axis parallel to the course of the fibers. The other portion presents the picture of a more or less degenerated nerve.

In the van Gieson preparations in cross-section the former shows numerous small disks with a central point, apparently the axis cylinder. The outer zone is stained a yellowish-green with a pink ring and a few deeply stained nuclei giving the whole a sharp contour, resembling the picture of a periperal nerve, but differing from this in its finer structure and more numerous neurilemma nuclei. Between these areas

there are irregularly scattered, round or ovoid, deeply stained nuclei around which there is just a trace of an irregular cell wall. The nuclei are identical with those found in the sclerosed areas of the spinal cord. Occasionally one sees a round cell with a deeply stained round nucleus. The cell is perfectly clear, the nucleus at times shows a distinct reticulum or regularly placed granules in its periphery with a few larger ones in the central portion. This cell is identical with the undifferentiated cells described in the foregoing. In the periphery of this area there is a marked proliferation of cells and apparently a proliferation of cells in the sheath of Schwann (Plate V, Fig. III—34). There are oblong and ovoid cells arranged in one or two rows; they vary somewhat in structure which gives them the appearance of the cells in the various stages of development which finally leads to fiber formation in some of the areas of the cord. Here and there these clear cells are situated under this stratum and among the cells forming the outer stratum. They are identical with the undifferentiated cells described in connection with the areas of the brain sections. In longitudinal sections the fibers appear yellowish-green with a central line of pink or a deep blue stained center in which there appears a pink line at frequent intervals and an elongated nucleus with blurred ends fading into the pink line.

The elongated nuclei can be traced with the longitudinal fibers of the root into the cord where other blood vessels are found around which a similar process is developing, while in other regions, but along the same course, nodules of varying size with numerous deeply stained elongated nuclei are seen. Near the central canal, in about the position of the central artery and vein, two large nodules represented in Plate IV, Fig. II—24, and Plate V, Fig. IV, show a whirl arrangement of its fibers. In the outer part of each nodule the lumen of the vessels can still be identified showing an intimate relationship with the vessel wall. Numerous long ovoid nuclei are lying in the course of the fibers, with blurred ends completely fusing with the fibers, some of them assuming a curved shape owing to the course of the fibers. The nuclei stain deeply, revealing a granular structure and a membrane with densely distributed chromatin granules. The characteristic features of the nuclei are, the elongated ovoid or cylindrical shape and their arrangement with reference to the fibers, giving a striking contrast to the oval nuclei of the endoneurium and the endothelial cells.

The nuclei of the connective tissue are not so deeply stained nor those of the endothelium. The nuclei belonging to the connective tissue frequently show a transverse direction with reference to the fibers, and both these and the nuclei belonging to the endothelium usually

contain a nucleolus. The area surrounding the nodules in the spinal cord show a dense neuroglia network giving the whole area concentric color differentiation, and it is evident without applying other differential stains that these nodules are not the usual sclerotic plaques, but despite this convincing picture other staining methods were used with interesting results.

The Weigert myelin sheath stain is almost as deep in the nodules as in the surrounding normal nerve tissue, and with a low power magnification these areas stand out prominently owing to the dense proliferated neuroglia surrounding the nodule. Higher magnification shows that the fibers are not so deeply stained as in the normal tissue, but their apposition is closer. There is a marked difference in the staining quality of the different fibers; the longer fibers seem to have taken on a deeper stain while the shorter ones are but faintly stained; the latter are more prevalent in the central part, the former in the periphery.

In the region of the posterior root this process shows an intimate connection with the pial sheath of the root, the pia of the cord, and the pial trabeculae extending into the cord. Here the area assumes a wedge shape with its apex inward and its base resting on the posterior root (Plate V, Fig. I—28); the whole process is apparently within the pial sheath following the course of the sheath, forming a cylinder directed obliquely toward the central part of the cord (Plate V, Fig. II). The cross-section of this region shows that the process remains within the pial sheath and the blood vessel wall. The fibers form in whirls gradually obliterating the vessel wall and eventually the lumen of the vessels. The neuroglia surrounding these areas is exceedingly dense, but in no way connected with the fibers of the rounding tissue (Plate V, Figs. 1 and II).

It is striking that the fibers of the more peripheral areas are more deeply stained and the staining quality diminishes toward the center. The posterior root-fibers show a marked demyelination which is also evident in the intramedullary root-zone. The neuroglia in this region is increased in cells and fibers which, however, does not extend into the pial sheath. This type of nodule was not demonstrated in the brain tissues.

The same sections of the spinal cord show other well defined areas with a structure well differentiated from that just described. Under low power magnification the nuclear elements are strikingly different in size, form, arrangement and staining.

The toluidin blue preparations show areas containing densely nucleated zones extending about a centrally placed vessel. Some of the areas show two, others three, definite zones. The nuclei of the

inner zone are much larger and more irregular in size, form and structure than those of the outer zones. In some of the areas the outer zone shows a greater number of nuclei many of which are identical with those in the normal neuroglia tissue, while those of the inner zone are nowhere found in the neuroglia tissue. These areas are identical with the areas described in sections of brain tissue, showing a progressive neuroglia new formation. Areas of the same structure are also in evidence in the nerve roots and root zones.

SUGGESTED CLASSIFICATION OF THE PATHOLOGIC PROCESS

In the classification of the demyelinated areas one encounters much convincing evidence that the pathologic process can be divided into two main divisions:

1. A process of evolution, which results in the building up of isolated areas of new tissue and the destruction of the tissue in which it develops.

2. A process of retrogression, which results in the breaking down of isolated areas of normal tissue and a reaction in the surrounding tissue which leads to secondary sclerotic areas.

The histology of the different areas is sufficiently characteristic so that they can be isolated on this basis and placed under the two heads. The pathologic changes frequently described as acute, subacute and chronic forms of the disease can, from an elementary standpoint, be classified as stages of the primary progressive process or steps of retrogression. However, there are groups of histologic elements which have no association with the surrounding tissue and do not enter the process of sclerosis, but form definite isolated areas. Such areas were found in the spinal cord and in the nerve roots in three of the cases which furnished the material for this investigation. (In the fourth case the spinal cord was not at hand.) Thus a third division must be made.

A process of evolution in which primarily only neuronic elements are involved and which forms characteristic nodules in the spinal cord and in the nerve roots.

I. PROCESS OF EVOLUTION

The process of evolution which determines the actual or primary sclerotic plaques, the characteristic lesion of primary disseminated sclerosis as designated by Charcot, can be isolated from all other areas according to this classification on a basis of its cytoarchitecture. The areas classified under the first head have no intermediate stage known as "fat granular cell myelitis," nor are there any definite stages in the evolution so far as the process, as a whole, is concerned and not until

retrogression in the areas begins can such stages be differentiated. The study of cell changes in such areas, from the beginning to their final disposition, consists of cell division, transitions to fiber formation, and retrogression of the cellular elements.

It is convenient to describe the areas of this type, occurring in the intramedullary and extramedullary root zones and in the posterior columns of the cervical cord. In the van Gieson and toluidin blue preparations many such areas present a characteristic microscopic picture under low magnification, in that they show two well defined nucleated zones consisting of two or more layers of somewhat variable nuclei. The one surrounding the lumen of a blood vessel, the other encircling the demyelinated area. The earliest deviations from the normal in the structural elements surrounding a capillary or precapillary vessel in the vicinity of the posterolateral septum of the posterior column, are indicated by cellular elements in the adventitial tissue or adventitial lymph spaces which are not found in the normal structure of the nervous system. Such elements consist of large round cells with structureless cytoplasm and a central well stained nucleus in which the chromatin is plainly visible. This type of cell varies little in size, and there are few in number. There are larger cells similar in form with perfectly clear cell bodies, and as they vary in size, there are accordingly variations in the nucleus. These variations are differences in staining, in size and arrangement of the stained bodies in the nucleus and in the size and form of the nucleus. Many of these types show no variation in the cytoplasm which remains clear and colorless. There are other cells still larger and ovoid in form which show indications, in the arrangement of the stained particles in the nucleus, of mitotic figures (Plate III, Fig. IV—18); others of the same type show a bilateral indentation of the cell body, while still others show a line of complete division, each stage presents a corresponding variation of the nucleus indicating a previous mitosis. In some of them fairly definite mitotic figures could be recognized. Some of the cells show various stages of division without any indication of a mitosis and it is possible that direct division also takes place. Under higher magnification the cytoplasm appears granular and is faintly stained. The elements increase in size till large protoplasmic fiber-forming glia cells are formed (Plate X). As these cell types increase in number they migrate into the meshes of the deeper layers of the blood vessel wall where they show some variations.

The transversely cut blood vessels show with van Gieson's a well stained pink wall of varying thickness, presenting a wavy connective tissue structure, the meshes of which show irregular spaces in which are seen cells of the type just described. They are all of the same

type in various stages of development as is indicated by their differential staining qualities. The cytoplasm stains faintly, but becomes more decided and variable with the nuclear change until the fiber formation becomes evident. The longitudinal sections of vessels show a similar structure. At irregular intervals the lumen is narrowed by wave-like constrictions. At some points there are wedge-shaped projections into the lumen of the vessel, some of which meet a similar projection of the opposite wall whereby the lumen of the smaller vessels is often obliterated and that of the larger ones narrowed. Under higher magnification it is shown that the structure of this new formation consists of a proliferation of cells of the same type as those described in the cross-sections of vessels.

In the Mallory anilin blue preparations it is evident that there are newly formed capillaries at the margins of the plaques which extend into the newly formed neuroglia tissue of the areas. In the Mallory phosphotungstic acid hematoxylin preparations the neuroglia fibers around each vessel radiate almost perpendicular to the vessel wall no matter in what plane the vessel is sectioned. The fibers are arranged in bundles parallel to one another with more or less interlacing, and more dense in the central portion, and because of fewer fibers toward the periphery of the plaque, the radiations are more apparent, which would indicate that the process extends from the center peripheralward. This is also evident in the more advanced stages where the central portion of the plaque is a structureless mass while the periphery still shows the rays of the neuroglia fibers (Plate VII, Fig. II). The plaque is sharply circumscribed by an abrupt margin determined by the difference in the arrangement of the neuroglia fibers within the area and those in the surrounding tissue. In the plaque the fibers course in regular undulating lines from a more or less definite central point, while in the surrounding tissue the neuroglia has a reticular arrangement. The neuroglia nuclei lie more often isolated, sometimes in short rows or groups between trabeculae of fibers. They are larger, clearer and more variable in form than in the normal tissue. In some of these areas they are more numerous in the central portion, while in others a greater number is seen in the periphery. Between the glia fibers are persistent axis cylinders of variable size and form; they lie either centrally or more or less peripherally, and sometimes at the margin of a clear space marked by the complete absence of the myelin sheath giving the impression of an empty tube in the center or to one side of which there appears the end of a cut cord. In longitudinal section the axis cylinders appear as irregular lines; some of them are thin and fine, others appear as thick but faintly stained bands situated in a clear space abutted by dense neuroglia tissue. The origi-

nal course of the axis cylinder is apparently not altered, as this corresponds to the location and the plane of the section in which it is observed.

The nerve cells in the regions where primary plaque formation occurs are apparently not displaced from their original location, and in many formed plaques there are nerve cells retaining their outline and structure, but others showing more or less intracellular changes characteristic of axonal reaction. Similar changes are seen in the nerve cells of the transition zone.

The van Gieson, Mallory and Alzheimer preparations show marked variations of size in the neuroglia fibers concerned in the areas of this type. The large fibers form bundles into which the finer fibers penetrate and form bundles of fine fibers lying between the larger fibers.

These trabeculae are arranged in regular undulating lines forming concentric layers closely pressed together about a more or less definite central point in which appears a blood vessel or a remnant thereof. The tissue becomes denser and denser until the fiber structure is completely obliterated.

The neuroglia tissue abutting the primary sclerotic plaque shows a greater density than the normal tissue. The nuclei are more numerous, but all relatively small and deeply stained. The tissue forms a dense network composed of fine and thicker fibers forming a narrow but definite zone between the normal tissue and the margin of the sclerotic plaque. The margin of the demyelination of the primary sclerotic area is abrupt. The Bielschowsky preparations show this clearly. There is no gradual fading out of the color within the area which is the case in the transition zone surrounding it. The only connections between the two are the newly formed capillaries extending from this area into the transition zone or vice versa. Sometimes the capillaries lie at the border of the area and follow this line for some distance.

Earlier in the development the axis cylinders can be traced from one zone to another; these show a difference in color which becomes darker as it passes into the reaction zone and finally into the normal tissue. Later they become invisible in the sclerotic area, but can be traced to its border.

In studying this type of plaque in the various sections of the nervous system the impression is received that the process remains the same except for the changes which necessarily follow variations in the normal architecture. The pathologic cell types in the areas of the posterior tracts of the spinal cord can be demonstrated in the areas occurring in the cortex and in the white matter of the brain as well as in the extra medullary and intramedullary nerve root zones. That this is true of the extramedullary root zone is an important factor

with reference to the origin of this type of sclerotic area which will be considered later. However, at this period the impression remains that the areas described under the head of primary sclerotic plaques are of a definite type in origin and development with a constant final disposition forming the essential lesion of the disease known as multiple sclerosis. To recapitulate: these areas in longitudinal and transverse section show a constant elementary structure which consists of newly formed neuroglia cells of the fiber-forming type which apparently have their origin in an undifferentiated embryonic element lodged in the adventitial tissue of the blood vessels. This undifferentiated element shows developmental changes which, when correlated, are the successive stages in a process leading to fiber-forming neuroglia elements and because of the arrangement of the tissue in which they are lodged they encircle the lumen of a blood vessel which forms the basis for the concentric undulating arrangement of the neuroglia fiber trabeculae and the outline and abrupt limitation of the primary plaque formation and the consequent slow demyelination of the nerve fibers in a certain radius. Very different is the development of the narrow reaction zone situated between the plaque and the normal tissue. Here the normal architecture is retained except that there is an increase in the nuclear elements and a condensation of the original meshwork and an alteration in the myelin sheath which is evident in the paler stain as compared with that of the normal tissue.

SYNOPSIS OF PART I

The primary sclerotic area, the essential lesion of multiple sclerosis, is characterized, as observed in toluidin blue and van Gieson preparations, and also Nissl preparations, by two densely nucleated zones, a perivascular and a marginal reaction zone. The perivascular zone consists of undifferentiated embryonic elements, large round and oval neuroglia cells in various stages of proliferation (multinucleated cells and cell division and various mitotic figures) and large protoplasmic cells with extensive protoplasmic processes which show differentiation into neuroglia fibers. The Alzheimer neuroglia cell stain fails to show ameboid forms in this zone. In the same preparations the marginal reaction zone shows numerous small and large nuclei belonging to variable neuroglia cells lying in the neuroglia fiber reticulum. The smaller cells predominate, they are generally round or slightly elongated and may contain one or more nuclei, but little protoplasm. A number of spider cells are irregularly distributed in this zone.

The Bielschowsky and Weigert preparations present a sharply circumscribed demyelinated area which borders on a more or less irregularly demyelinated marginal transitional reaction zone. In the primary

sclerotic area the axis cylinders are more persistent, while in other zones their distintegration varies directly with that of the myelin sheaths.

In the Mallory phosphotungstic acid hematoxylin preparations and the van Gieson neuroglia stains, the neuroglia fibers appear as concentrically arranged bundles placed perpendicular to the plane of a central blood vessel. Between the trabeculae there are finer fibrils which interlace with those of the larger ones. In the marginal reaction zone the normal architecture is retained and consists of a dense meshed fibrillar neuroglia tissue. The blood vessels appear more numerous and their walls are thickened. This arrangement forms a condensation of the normal glia meshwork with a corresponding loss of myelin sheaths and axis cylinders. The demarkation of the two zones is abrupt owing to the difference in the structure of the neuroglia. The Herxheimer preparations do not show fat granule cells or any products of disintegration in the sclerotic area, and there is no stage of "fat granular cell myelitis." Some of the ganglion cells in these areas are well preserved; many, however, show the change characteristic of axonal reaction.

II. PROCESS OF RETROGRESSION

A process of retrogression forming secondary sclerosed areas the result of a reaction incident to the primary lesion.

Such areas occur in the same sections with the primary sclerotic plaque. In longitudinal section of a vessel both types are present. The secondary sclerotic areas in the same preparations are characterized by the almost complete absence of myelin. In this area there are three definite nucleated zones conforming to the outline of the demyelination. Within the area two cell types are prominent, proliferating glia cells with numerous processes and fat granule cells. The larger blood vessels are dilated and have thickened walls, the lumen of the smaller vessels is frequently obliterated. The axis cylinders are persistent in various forms. Observing the inner zone under higher magnification, it appears that there are a large number of cells in the tissue spaces surrounding a blood vessel and in the tissue of the vessel wall including the media where two kinds of cell elements predominate:

1. The large vacuolated fat granule cells with central or peripheral nucleus. These cells are composed of a very large number of irregularly round granules which stain black with osmic acid and a bright red with Scharlach R. Some of the cells are completely obliterated by these granules and appear as a large mass of black or red granules, or clumps forming concentric rings around the lumen of the vessel wall. In this inner zone no granules are found outside of the cells and the narrow spaces between the cells are clear.

2. The large protoplasmic glia cells with branching processes. In the toluidin blue preparations these cells appear in the various stages of development; this is evident in the variations of the large vesicular nucleus which usually shows one or more deeply stained nucleoli. The nuclear variations consist of changes in position and form of the nucleus and in the arrangement and density of its chromatic substance. Closely associated with these are multinucleated cells in various stages of division of the cell body. In the phosphotungstic acid hematoxylin preparations the protoplasmic processes of the cells show minute fibrils which extend between the surrounding elements some distance following the course of the tissues of the vessel wall. In the toluidin blue preparations other cell elements are observed. In the adventitia there are a variable number of small, round cells, with deeply stained nuclei and a small amount of protoplasm; these are proliferated connective tissue elements of the adventitia. The endothelial cells of the capillaries are increased, some of them detached and apparently have passed into the surrounding tissue. They have increased in size, forming large, round cells with a central nucleus in which a more or less definite structure appears. The chromatin stains well, while the cell protoplasm is but faintly stained with hematoxylin. From such a cell the different stages of development can be traced to their final dispositions, as the fat granule cell. In some of the areas they occur isolated in the tissue, in other areas they are present in large number and bear a direct relation to the disintegration of the myelin sheaths. Together with the fat granule cells there are other nucleated elements in the adventitial tissue, and in the toluidin blue preparations which appear as small cells, whose nuclei are scarcely distinguishable from the former. They have dark purplish-blue nuclei and cytoplasm of a lighter blue color in which a few dark blue or purplish granules are present. There are also large mononuclear cells with deep blue or dark lilac colored nuclei.

The cytoplasm of some of these cells is pale blue, in others it is of a deeper blue; it contains dark lilac or deep purple-colored granules. Two other forms appear less frequently. They are about the size of polynuclear leukocytes with purplish or dark blue, irregular-shaped nuclei, and with cytoplasm of a lighter blue in which are embedded numerous coarse, dark purple granules of variable size. Another type of cell frequently observed in the adventitial tissue is a comparatively large cell, irregularly round or ovoid with a deeply stained round or oval, eccentrically placed nucleus. The cytoplasm is comparatively large in amount and stains a deep blue except a small portion adjoining the nucleus which takes on a deep violet color.

These various forms of cells are apparently leukocytes, mast cells and plasma cells, respectively.

The Kulschitsky-Pal and Weigert preparations show a more or less complete absence of the myelin sheaths in the perivascular zone, but few axis cylinders persist, and those present are markedly altered. The glia trabeculae are thickened and the finer fibrils form a reticulum. Some of the glia meshes are obliterated by a dense fibrillary feltwork. Surrounding this zone is an intense proliferation of darkly stained nuclei which are mostly the nuclei of large protoplasmic glia cells, though many epithelioid cells lie between the latter.

In the periphery of the perivascular nucleated zone, the arrangement of the nuclei is more irregular, the nuclei are smaller, more variable and more numerous than in the normal tissue, and the glia fibers form a reticulum. The myelin sheath stain is apparent and shows a gradual increase in intensity toward the periphery until the transition merges into a deep blue color, and thus there is a definite transition zone without an interruption between the pathologic tissue and the normal. While there are striking contrasts in the different areas belonging to the secondary changes, they all have the characteristic elements of a reacion which separates that from the primary lesion and the variations in them are sufficiently definite so that they can be grouped as successive stages of a secondary sclerosis as follows:

1. What may be considered as the first indication of a change in the tissue, characteristic of a secondary reaction, which is best shown in the toluidin blue and van Gieson preparations, is a slight swelling of the tissue meshes. The small capillaries are dilated and engorged with blood, the adventitial lymph spaces show a slight dilation, and in the van Gieson preparations the myelin sheaths do not stain so well in this area and the axis cylinders are swollen and take on a diffuse pink stain. These changes indicate a stasis such as is found in myelitis. In the toluidin blue preparations of the same area there are various mononuclear cell types in the adventitial spaces. These are mostly leukocytes, but there are plasma cells and mast cells which have already been described. In the perivascular tissue the normal spider cells show a distinct enlargement of both the nuclei and the protoplasmic processes. The smaller glia nuclei do not stain so deeply within the areas as in the tissue outside. These changes, though slight, present under low magnification definitely circumscribed areas because of the increase in the nuclear content of the adventitia and the contrast in the stain between the perivascular area and the surrounding tissue.

2. In another area, the next stage in this process, there are large, isolated, epithelioid cells which vary greatly in size and in the staining of the protoplasm. In the larger cells, the nucleus has a definite chromatin structure and the protoplasm takes on a faint hematoxylin stain. Some of them are vacuolated and the protoplasm stained faintly

purple has a distinct membrane surrounding it. These are apparently fully developed "fat granule cells" and mark the beginning of a "fat granule cell myelitis" of other writers which is characteristic of secondary reaction changes. In this area the swelling of the structural elements is more marked. Large protoplasmic glia cells are present, some of which are multinucleated. The myelin sheath of individual nerve fibers is but faintly stained, some of them are unrecognizable, in others only an outline of the myelin can be seen. The axis cylinders are faintly stained and lie in the center or to one side of a clear space. The vessel wall shows a nuclear increase. The endothelial cells are proliferating, some of which have become detached, lying perpendicular and oblique to the vessel wall. Everywhere in the area the small vessels are prominent and give the impression of an increased number within and in the neighborhood of the area, but this is probably because they are more perceptible, due to engorgement and nuclear proliferation.

3. In this area, the following stage appears as an exaggeration of the former. The fat granule cells are more numerous, the whole tissue in the area is permeated with them, they fill every tissue within the area, so that each vessel in cross-section is surrounded by two uniform cellular rings of one or two layers and sometimes three, of fat granule cells, among which are large protoplasmic multinucleated spider cells. The long ramifying processes of the enlarged glia cells extend over a long distance between the fat granule cells following a more or less circular course. There is an increase in the nuclei of the adventitia showing a definite reaction in both the endothelium of the small vessels and in the adventitial wall of the precapillary vessels which at a later stage becomes evident in a connective tissue proliferation which is well shown in the preparation of Mallory's anilin blue stain. There are fibers which stain a deep blue; these represent the connective tissue of the vessel wall; between these is a reticulum of bright pink fibers in the meshes of which are nuclei of the same color. There are also much finer fibers following the course of the connective tissue trabeculae containing elongated nuclei placed parallel to the fibers which are stained pale pink. The fibrils are of the same color. They are of different size, arrangement and color than the neuroglia fibers and nuclei, and must be regarded as fibroglia fibrils and nuclei.

4. The observations made in the Mallory preparations and those which have just been described represent the main histologic features of this stage. The fibrillation is more dense, the nuclei are diminished in number, differentiation of the fibers is more difficult and finally the neuroglia fibers cannot be demonstrated. In the perivascular zone there is already a dense neuroglia fiber reticulum, the cellular elements

are less in evidence. The myelin sheath stain no longer appears, and there are but few persisting axis cylinders which are faintly stained. In the transition zone there is a gradual increasing density of the neuroglia tissue, though the normal architecture is retained. The myelin sheath stain shows an irregular color which is more intense toward the periphery. The axis cylinders are preserved in varying degrees, which is indicated by the variations in the stain. Here and there are a few fat granule cells and an occasional spider cell.

5. The essential feature of this period is a further development of the fibrillar neuroglia tissue. In the Mallory phosphotungstic acid and van Gieson preparations the protoplasmic processes of the large spider cells show a more marked differentiation into the fiber elements, many of which have become independent of the process, but retain a more or less definite relationship to the nucleus. The fibers appear in the trabeculae which assume a parallel position to the direction of the nerve fibers. Between these there is an interlacing, forming elongated and ovoid spaces which are occupied by fat granule cells. The irregular form of many of the fat granule cells within the tissue spaces makes it apparent that they are compressed by the constantly increasing fiber formation. As the fibers become more and more dense, the fat granule cells occur less frequently in the tissue spaces. Some of the remaining cells appear as a vacuole in the dense neuroglia tissue or as an irregular mass of granular protoplasm in which the nucleus is barely recognizable. In the adventitial spaces within the area and in the transition zone there are numerous cells of this type. The structural changes in the cells, and the differentiation of the cells appear most distinctly in the toluidin blue preparations.

The nuclei of many cells are crenated and without a definite membrane, these belonging to the fat granule cells undergoing degeneration. There are numerous nuclei among which the small, round, deeply stained ones predominate which belong to the small neuroglia cells. The other nuclei are those of the larger glia cells and of the endothelial cells.

Finally no fat granule cells remain either in the perivascular tissue spaces or in those of the vessel wall. The glia nuclei are fewer in number than are normally present in the location in which the process occurs, and they are mostly small but retain to a considerable extent the circular arrangement around the vessel wall and in the perivascular tissue, so that the three original zones are easily recognizable (Plate I, Figs. III and IV). In the vessel wall there appear trabeculae of fine fibrils and among them small elongated nuclei whose long axis is parallel to the fiber trabeculae. In the Mallory anilin blue acid fuchsin preparation these fibrils and the nuclei stain red while the tissue of the

vessel wall stains blue (Plate II, Fig. IV). There is apparently a gradual increase in the density of the former which completely obliterates the spaces in the vessel wall and until all of the fibers fuse into a homogeneous mass, which takes on a pale pink stain. The neuroglia proliferation in the perivascular zone is in proportion to the process in the vessel wall. The tissue in this zone has been altered to a dense feltwork and in great part the nuclei have perished. The transition zone keeps pace with the other zones, the glia reticulum shows a greater density though the normal architecture is preserved, nuclei are more numerous and more regularly placed than in the other zones, the axis cylinders are more persistent. In the final stage of complete sclerosis it is still possible to distinguish the three zones which characterize these areas throughout their development and which is dependent on the density of its elements (Plate I, Fig. VI). There are other areas that properly come under the head of secondary changes. The areas described in the preceding pages all have a place in the successive stages of the development of primary and secondary sclerotic plaques.

(This article will be concluded in the February number)

PLATE I. SECONDARY CHANGES IN THE CORTEX

Fig. I.—Secondary lesion of cortex. Perivascular edematous zone (1). Peripheral zone showing neuroglia cell proliferation and nerve cell changes (2). Toluidin blue.

Fig. II.—Cortex showing axonal reaction in nerve cells and pathologic neuroglia cells in the transition zone of a secondary lesion. Toluidin blue.

Fig. III.—Cross-section of vessel at margin of secondary focus. Lumen (5). Fiber-forming neuroglia cells (8). Fat granule cells (9). Pathologic neuroglia cells (10). Phosphotungstic acid hematoxylin stain.

Fig. IV.—Secondary changes in vessel wall following exudate. Dense glia fiber network (6). Vessel lumen (5). Neuroglia fibers pink, connective tissue fibers blue (7). Mallory connective tissue stain.

Fig. V.—Secondary lesion showing the three characteristic zones. Perivascular space (1). Peripheral nucleated zone (2). Perivascular nucleated zone (3). Transition zone (4). Engorged lumen of vessel (5). Toluidin blue.

Fig. VI.—Cross-section of thrombosed vessel showing three nucleated zones of secondary lesion. Perivascular nucleated zone (3). Peripheral nucleated zone (2). Transition zone (4). Silver impregnation method.

PLATE 1

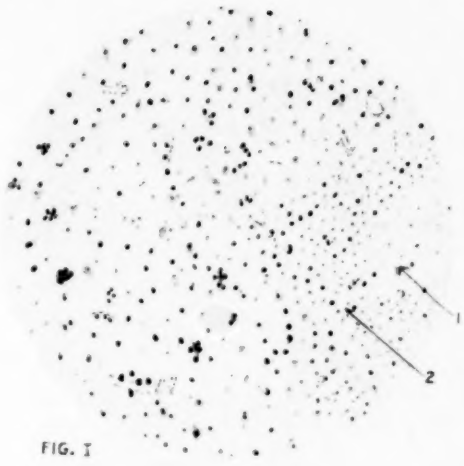

FIG. I

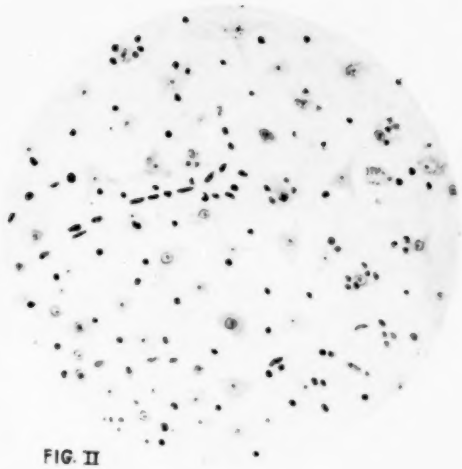

FIG. II

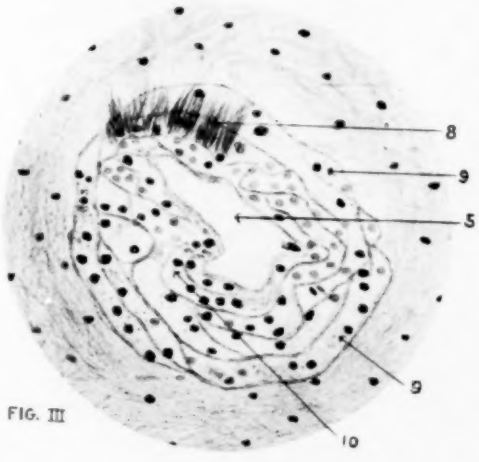

FIG. III

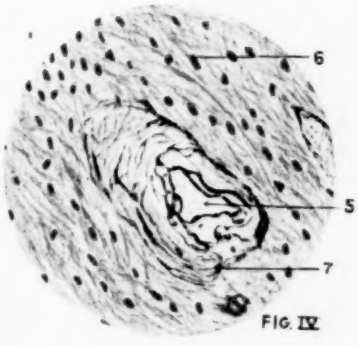

FIG. IV

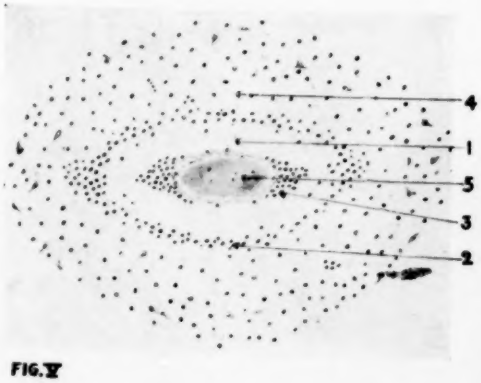

FIG. V

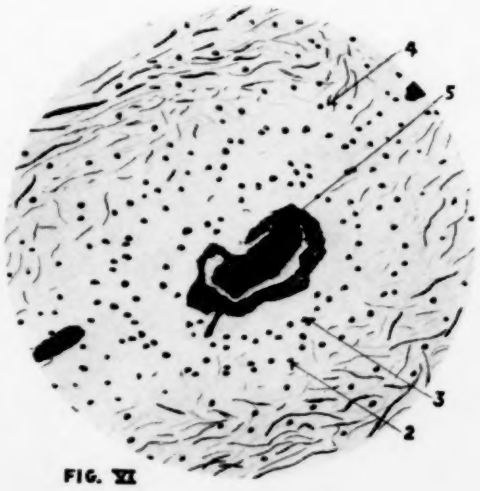

FIG. VI

PLATE 2.—PERIVASCULAR CHANGES IN CORTEX THE RESULT OF A CIRCULATORY OBSTRUCTION

Fig. I.—An arrested secondary sclerosis showing "areolar area," secondary perivascular changes. Lumen of vessel (5). New formed capillaries (7). Van Gieson stain.

Fig. II.—Secondary perivascular changes the result of edema and softening. Van Gieson stain.

Fig. III.—Longitudinal section of obstructed vessel with exudate showing thrombus formation. Lumen of vessel (5). White thrombus (11). Primary lesion (12). Wedge-shaped projections of the vessel wall, focus of primary lesion (13). Van Gieson stain.

Fig. IV.—Secondary neuroglia proliferation in the perivascular neuroglia zone. Outer perivascular neuroglia zone (3). Pathologic neuroglia cell (10). Multinucleated cell—giant cell—(14). Mitotic neuroglia cell (18). Toluidin blue stain.

PLATE 2

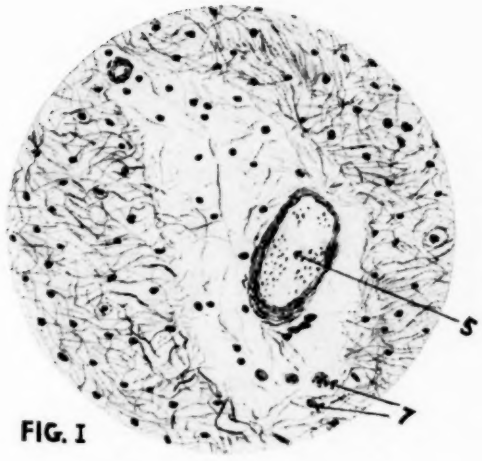

FIG. I

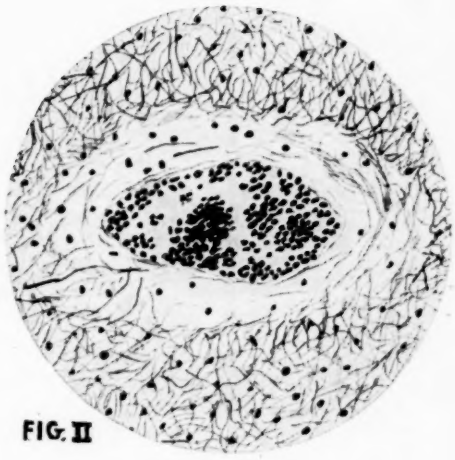

FIG. II

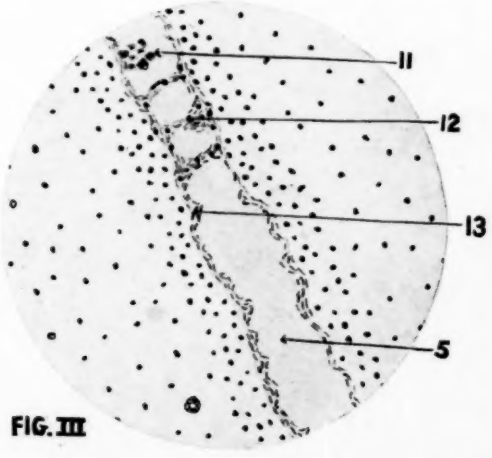

FIG. III

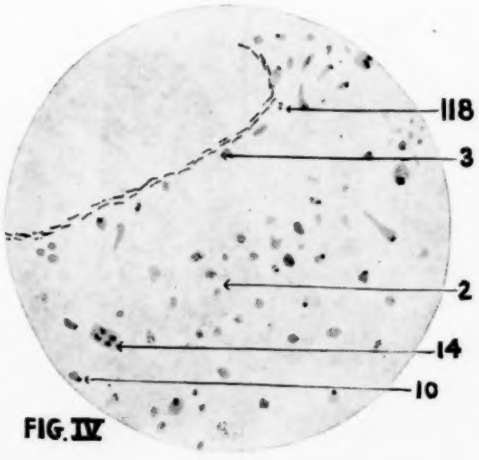

FIG. IV

Plate 3.—Changes in Cortex Showing Cell Types

Fig. I.—Embryonic type of nerve cell showing bilateral indentations and double nucleus. Toluidin blue stain.

Fig. II.—Cross section of a vessel including branch showing cell types in various stages of development. Normal neuroglia (15). Nerve cell (16). Undifferentiated cell (17). Intravascular and extravascular (17). Binucleated epithelioid cells (18). Fibroblast (19). Toluidin blue stain.

Fig. III.—Longitudinal section of an unobstructed capillary showing various cell types. Note beginning changes in nucleus of undifferentiated cell. Undifferentiated cells intravascular and extravascular (17). Mitotic cell (18). Nerve cell (16). Ameboid neuroglia cell (20). Toluidin blue stain.

Fig. IV.——Longitudinal section of engorged vessel showing wavy outline of vessel wall and various cell types both within and without the vessel. Pathologic neuroglia (10). Undifferentiated cells—intravascular and extravascular (17). Mitotic neuroglia cell (18). Fibroblast (19). Toluidin blue stain.

PLATE 3

FIG. I

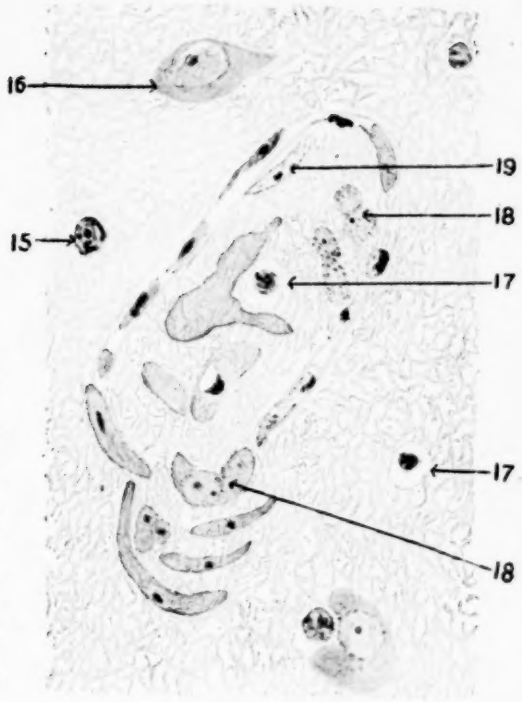

FIG. II

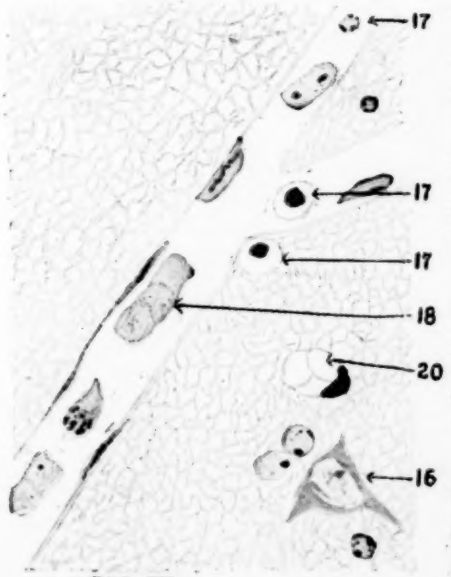

FIG. III

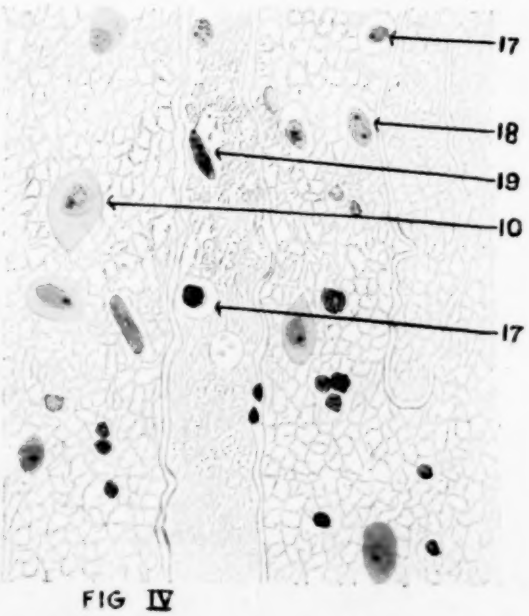

FIG IV

PLATE 4.—LOCALIZATION OF PRIMARY LESIONS IN SPINAL CORD AND NERVE ROOTS

Fig. I.—Cross-section of thoracic cord showing large demyelinated areas and intramedullary and extramedullary root changes. Primary lesion in anterior root (20). Primary lesion in posterior root (22). Demyelinated areas the result of primary lesion (23). Pal-Weigert stain.

Fig. II.—Cross-section showing neuroma in gray commissure of the cord. Note the chain-like arrangement of embryonic types of cells in the periphery. Neuroma (24). Obstructed blood vessel showing neuroglia reaction zone (25). Central canal of the cord (26). Van Gieson stain.

PLATE 4

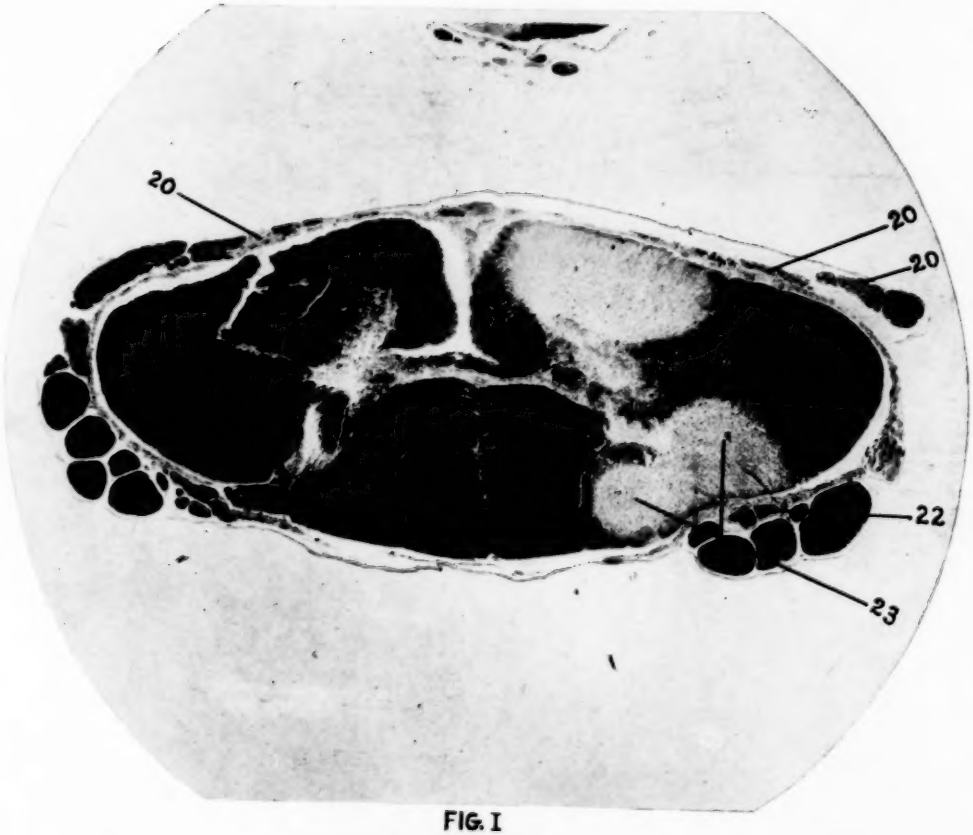

FIG. I

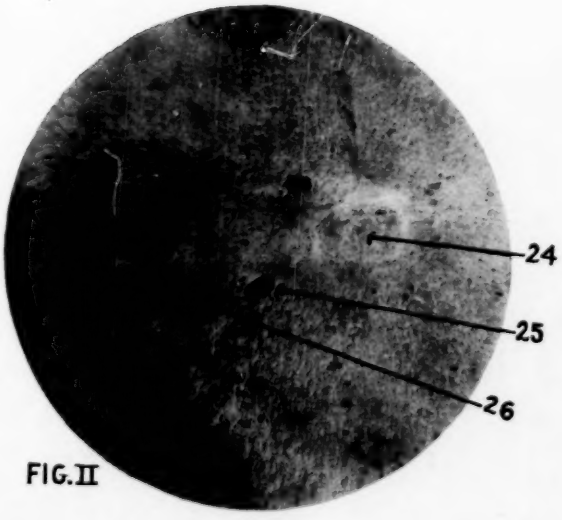

FIG. II

PLATE 5.—CIRCUMSCRIBED LESIONS OF AN EMBRYONIC STRUCTURE IN THE SPINAL CORD, NERVE ROOTS AND ROOT ZONES

Fig. I.—Embryonic neurofiber formation in extramedullary anterior root. Note elongated cells in the path of the fibers. Lumen of vessel (5). Fibroblast (19). Piameter (27). Degenerated nerve fibers (28). Cross-section of intramedullary zone showing demyelinization and swollen axis cylinders (29). Van Gieson stain.

Fig. II.—Extramedullary posterior root showing plaque formation. Intramedullary posterior root (30). Primary plaque formation (31). Normal nerve root (32). Neuroglia proliferation (33). Van Gieson stain.

Fig. III.—Extramedullary posterior root showing proliferation of cells in sheath of Schwann. Fiber forming neuroglia (8). Undifferentiated cells (17). Mitotic neuroglia cells (18). Pia mater (27). Embryonic cells in Schwann's sheath (34). Normal axis cylinders (35). Swollen and degenerate axis cylinders (36). Van Gieson stain.

Fig. IV.—Neuroma from gray commissure of cord (Photo. Plate II, Fig. II). Neuroblasts showing fiber formation (37). Van Gieson stain.

PLATE 5

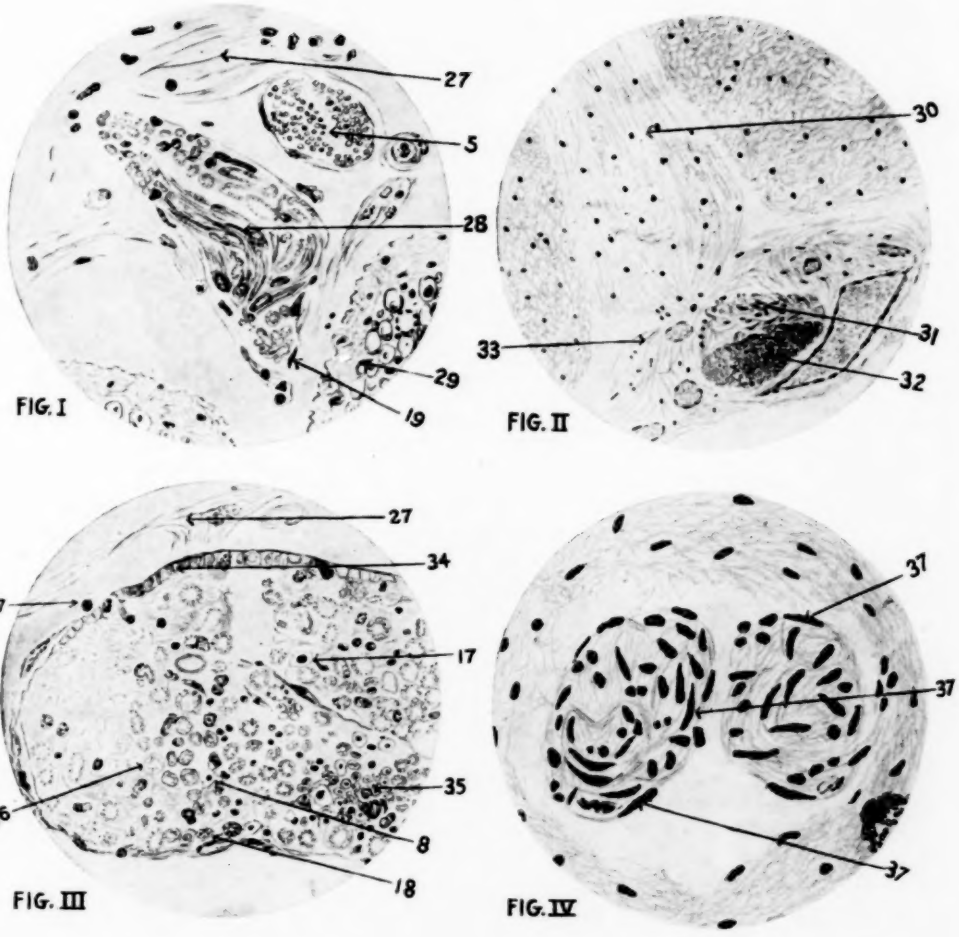
27
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FIG. I
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FIG. II
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FIG. III
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FIG. IV

SO-CALLED "SHELL SHOCK": THE REMEDY*

FRANCIS X. DERCUM, M.D.
PHILADELPHIA

The problem of the functional nervous disturbances met with in soldiers, is one which, on account of its magnitude and importance, demands serious and frank consideration. Because of the unfortunate use of such terms as "shell shock" and "war shock," erroneous conceptions have become prevalent both among lay persons and among physicians. Shock, we should remember, is a surgical condition associated with or the outcome of physical trauma, gross and organic, such as serious injuries of the head, trunk or limbs. It is an acute condition from which the patient reacts, if he is to recover at all, within a few hours, almost always within 24. It is this condition to which the term "shock" was first applied by English surgeons and to which the term should be limited. The application of the term to the functional nervous disorders observed in soldiers is greatly to be deprecated.

SYMPTOM GROUPS

An examination of the reported cases of so-called shell shock or war shock reveals familiar symptom-groups. The cases can be readily classified under conditions already well known to neurologists. They do not differ in any essential particular from those met with after railroad or other accidents. One need hardly recall the palsies, contractures, mutism, deafness, blindness and other well known functional disturbances met with alike after railroad accidents and after war experiences, to realize their common character; and in reflecting on their nature, we are at once carried back to the history of railroad accident cases and their interpretation. We all recall the change that took place in medical conceptions when the theory of spinal concussion of Erichsen gave way with increasing experience to the recognition of the fact that the symptoms were purely functional in character. Moeli pointed out the mental origin of the symptoms and the rôle played by fear, fright and excitement. Wilkes, Walton and Putnam showed that the symptoms were hysterical in nature. Thomsen and Oppenheim came to similar conclusions though both made reservations as to the partial existence of organic lesions. Charcot maintained that the symptoms are exactly the same as can be produced by hypnotic suggestion; that they are due to hysteria and nothing but hysteria,

* Submitted for publication Oct. 30, 1918.
* Read at the Annual Meeting of the American Neurological Association, Atlantic City, N. J., May, 1918.

and that they have no anatomic basis whatever. In two patients dying of intercurrent affections, one of aneurysm and the other of alcoholism, and which cases came to necropsy, a careful microscopic study of the brains and cords (the results of which were reported by me in a paper read before this society in 1895[1]) failed to reveal any lesions whatever. We all recall, further, how the terms spinal concussion and railway spine, once so widely used, were replaced by Oppenheim's term—the traumatic neurosis. Unfortunately the word neurosis because of its vague and indefinite meaning failed to convey an adequate conception of the conditions present. Notwithstanding, the expression traumatic neurosis soon became the vogue and was universally used. Later, however, the hysterical nature of the symptoms becoming more and more evident, it gave way to the expression traumatic hysteria. For a time, also, such terms as traumatic neurasthenia, and hybrid expressions such as traumatic hystero-neurasthenia were employed, but they finally and definitely gave way with an increasing experience to the term traumatic hysteria.

WHAT IS HYSTERIA?

Time unfortunately will not permit of an exhaustive discussion of the nature of hysteria. Let us, however, recall to our minds some elementary though oft forgotten facts; for example, the origin of the name from the Greek word for uterus, *hystera* (ὑστέρα), and the theory of the wandering uterus of the ancient Greeks; a theory which persisted in some form or other down to the days of Lepois, Sydenham and Willis, when hysteria was finally recognized as a nervous disease. Subsequently, it was variously regarded as a disease of the spinal cord or of the brain by Ollivier, Todd, Porter and Georget. Later, Briquet denied that it had anything to do with the spinal cord or any of the viscera, but that it had its origin in a dynamic disturbance of those portions of the brain that have to do with the affects and perceptions. We all recall the historic clinical studies of Charcot and of his pupils Paul Richer and Gilles de la Tourette, which in due course followed, and the elaborate chartings of the symptoms to which these studies gave rise. Moebius later emphasized the fact that all of the symptoms of hysteria are psychic in origin, but the next really great advance was made by Babinski. We all recall Babinski's experience with his 100 consecutive cases of hysteria not previously examined by physicians, which he tested for hemianesthesia and in which suggestion being carefully avoided, he failed to elicit the symptom in a single case. What was true of anesthesia proved to be true of the other symptoms as well. All are the result of suggestion.

1. Dercum: J. Nerv. & Ment. Dis., August, 1895.

The next fact of importance to be realized is the following: If we test a healthy or normal individual for anesthesia, making at the same time free use of suggestion both direct and indirect, we invariably fail to develop the symptom. In other words, the normal individual repels, the hysteric individual accepts the suggestion. It is this vulnerability to suggestion, this feebleness of resistance, which forms one of the fundamental features of the neuropathy of hysteria. Further, just as the reaction of the hysteric subject to suggestion is excessive and pathologic, so is his reaction to emotional stimuli. That the hysteric patient laughs and cries more readily than does the normal person is a fact of common experience. Emotional instability and exaggerated emotional expression are symptoms of every-day observation. The hysteric person is more readily frightened than is the normal person, and both the fright and its manifestations are commonly out of all proportion to its cause. Very frequently the latter is trivial; so much so, at times, as to be practically nonexistent. Among the many causes other than fright which may induce excessive emotional reaction in hysterical persons, are, as we all know, annoyance, disappointment, mortification, fancied slights, wrongs or insults, grief, shame, the shock of sexual experiences, the worry over sexual peccadilloes and kindred matters.

Given a reaction to suggestion and to emotional stimuli that is excessive, it follows as a physiologic corollary, that the mental state should express itself outwardly in an excessive physical reaction. Thus, the outward manifestations of fright are commonly very great; sometimes so much so as to appear to be in excess of any possible emotion. What is true of fright is, of course, true of all the other mental states. It is for this reason that an idea communicated by suggestion expresses itself in hysteric persons with such extraordinary ease and rapidity in some corresponding outward reaction.

The facts justify no other conclusion than that hysteria is an affection which is innate in the individual; the hysterical woman or hysterical man is born, not made. Hysteria, further, is a neuropathy of degeneracy. Hysterical persons with few exceptions occupy the ranks of the incapables. They lack endurance, lack persistence, lack fixity of purpose, lack those staying qualities which are necessary to bear the strain of life, to meet the exigencies of existence. In keeping with this fact, heredity naturally plays a large rôle. The hysterical strain can very commonly be traced from a hysterical mother through her various children. Again, the family histories may reveal other neuropathic disorders, mental disease and alcoholism. Charcot and his pupils regarded hysteria as an affection always inherited; all other factors have merely the value of "agents provocateurs"; the latter are merely incidental and at most lead to the development of surface and

outward manifestations; they do not produce the underlying neuropathy. That already exists.

It is further significant that cases presenting crass hemiplegia, hemianesthesia, contractures, blindness, deafness and like symptoms are found almost exclusively in the outpatient departments of hospitals and in hospital wards. The private rooms rarely contain them. They are rarely found among the better middle or higher classes. The hysterical claimants in the courts, too, are usually at the level of the outpatient class. There is here a fact of profound biologic significance. Hysteria when met with in the upper classes usually expresses itself by a more recondite and more purely psychic group of symptoms; but no matter how presented, the facts lead inevitably to the scientific inference that the neuropathy which we term hysteria is expressive of a biologic inferiority.

INFLUENCE OF ACCIDENTS IN DEVELOPING SYMPTOMS

Let us now turn our attention to the rôle of accidents in the development of symptoms and to the influences which determine the persistence of the latter. Of necessity our consideration must again be brief. However, we are at once impressed at the outset by the fact that, in the development of symptoms, trauma unconnected with fright plays no rôle. It is a noteworthy fact that trauma occurring during sleep or during surgical anesthesia is never followed by hysteria. Again, it is a matter of common experience, that persons injured during sports, in gynmnastic exercises, in foot-ball, never develop hysteria. To these facts it need hardly be added that, in the absence of the preexisting neuropathy and in spite of the undoubted presence of fright, trauma likewise fails to develop hysteria; as witness the rarity of the affection in locomotive engineers, firemen, brakemen, conductors, motor men, iron workers, and the like.

The next truth for us to recognize is that the phenomena of hysteria persist so long as the suggestion which called them forth persists. A hysterical woman may have a fall and subsequently because of the associated fright and the suggestion of injury into which the occurrence resolves itself, may present a hysterical paroxysm. Most frequently persistent hysterical phenomena, such as palsies and anesthesias, do not ensue immediately; indeed, not until some time has elapsed; time is necessary for the suggestion of injury to become fully operative. It is here that the lessons taught by hysteria following accidents which lead to claims for compensation, are especially instructive. In hysteria evoked by accidents uncomplicated by claims for compensation, the interval of time is usually short and the later-developing symptoms, if any, rarely pronounced. The latter, as a rule,

fade and disappear spontaneously, or readily under the suggestion of treatment. However, if the attitude of those about the patient, or the character of the treatment instituted, or ill-advised remarks by the physician confirm the belief in injury, the symptoms may persist for a very long time. Especially is this the case if the patient be made an object of interest, of sympathy, or of coddling care. This is a point of very great importance, for under such circumstances the symptoms may persist almost indefinitely. However, in the vast majority of cases uncomplicated by such factors, the symptoms never become pronounced; they rapidly subside, and the individual soon resumes his usual condition.

When we turn to the lessons furnished by hysteria involving claims for damages, the picture, as we know, is a very different one. The presence of the element of compensation introduces a factor which influences alike the development, the intensity and the duration of the symptoms. Four years ago, in a paper read at the Albany meeting of this Association, I fully considered this subject, basing my statements on 447 personally studied cases which presented the characteristic picture of accident hysteria. (This paper was subsequently expanded and has since appeared in book form.[2])

The facts influencing the development and the persistence of symptoms may be illustrated as follows: An individual has been frightened by an accident; perhaps he has received a few inconsequential bruises or other injuries in themselves insignificant or perhaps absolutely no physical injuries whatever; he becomes immediately the object of care on the part of by-standers and others; and sooner or later as a result of the suggestion of injury presented by the accident, reenforced by incautious questionings and repeated medical examinations, he develops frank hysterical phenomena — weaknesses, palsies, anesthesias or what not. The pernicious influence of repeated and needless medical examinations, fraught as they are with suggestion, cannot be too strongly emphasized. Sometimes even the initial fright of an occurrence has been slight, has not been evident to bystanders, or has itself never taken place; but the patient, as a result of witnessing the effect of the accident on others, himself develops hysterical symptoms—usually somewhat later, sometimes after several days or even a week or two. Perhaps he stood around at the time of the accident, assisted others, walked about unattended, and yet subsequently, after suggestion has had time to become operative, he develops hemiplegia, blindness, deafness, convulsions, or perhaps some other hysterical manifestation.

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2. Dercum: Hysteria and Accident Compensation, Philadelphia, The George T. Bisel Co., 1916.

In hysteria ordinarily, the symptoms are often fugitive and shifting, and often rapidly subside either spontaneously or under suggestion and persuasion. It is unnecessary to point out again that, on the other hand, they may be confirmed and prolonged by the injudicious conduct of friends and relatives and especially by an unwise and unnecessary course of treatment. Further, a lesson also applicable to the hysteria of war, may be gathered from the influence of litigation. The influence of litigation or rather of the expectation of compensation, constitutes a remarkable proof of the fact that the symptoms persist so long as the suggestions which called them forth persist. Under these circumstances the most radical and persistent efforts at cure fail unless the suggestions have been eliminated. In the paper read at Albany just referred to, I placed on record from the large amount of material at my disposal twenty cases in which the symptoms had been so pronounced that in each instance the plaintiff had been carried into court on a stretcher or was—so it was alleged—too seriously injured to be brought into court at all, and in each of which a speedy disappearance of symptoms ensued after the claim for damages had been disposed of; and this too when the symptoms had persisted for many months and in a number of instances for several years.

The foregoing facts in regard to accident hysteria are in general accord with those presented by other writers. Among the latter may be mentioned Schultze, H. Sachs, Erben, Ziehen, Huebner, Morselli, Heynold, Bondurant, Winderscheid, Bailey, Murri, Wallace, Crook, Malone, K. Mendel, Schaller, Milton, Byron Bramwell, Boone, Dye, Morselli, Dillon and Sir John Collie.[3]

HYSTERIA FOLLOWING SHELL SHOCK

When we turn our attention to the hysteria of so-called shell shock, a parallel series of facts present themselves: (1) as to the preexisting neuropathy; (2) as to the occurrences which evoke the symptoms, and (3) as to the causes which lead to the persistence of the symptoms. The preexisting neuropathy has been emphasized by Osler,[4] Forsyth,[5] Mott,[5] Adrian and Yealland,[5] Wolfsohn[6] and by others. In Viets'[7] excellent digest of the English literature of shell shock, the facts are summarized by the statement that "it has been found in a large majority of cases of shell shock that the patients have a neuropathic

3. Refer to bibliography, Dercum: Hysteria and Accident Compensation, footnote 2.

4. Osler: J. A. M. A., **69**:290, 1917.

5. Quoted by Viets (Note 9).

6. Wolfsohn: J. A. M. A., **70**:303, 1918.

7. Viets: J. A. M. A., **69**:1779, 1917.

tendency or inheritance." Viets quotes Forsyth as saying: "In all cases coming under the writer's notice with symptoms which were more than mild or transitory, a history of some earlier nervous troubles, slight or severe, was forthcoming," and further that "the occurrence of a definite neurosis is to be looked for only in psychopathic individuals, the onset representing the collapse of what is already unsound." Again, Adrian and Yealland in a report on 250 cases say: "There are certain mental abnormalities which are present to some extent in nearly every patient. The majority of patients are below the average normal intelligence as judged by the Binet-Simon scale, and others who are more highly equipped prove to have an unstable history either personally or in the family." Finally, Viets quotes Mott as saying: "Of even greater importance than the extrinsic conditions in the causation of military unfitness from exposure to shell fire are the intrinsic conditions, for if there is an inborn timorous or neurotic disposition, or an inborn or acquired neuropathic or psychopathic taint, causing a *locus minoris resistentiae* in the central nervous system, it necessarily follows that such a one will be unable to stand the terrifying effects of shell fire and the stress of trench warfare."

The same general truth is also recognized by G. Elliot Smith and Pear,[8] who express themselves as follows: "It is thus obvious to anyone who gives the matter any serious consideration, that the manifestation of a severe psychical shock must necessarily be determined in a large measure by the nature of the mind on which the injury falls. It would be idle to pretend therefore that, in diagnosis, the story of the patient's past experience can be left out of account, for the manifestation of the injury will obviously depend largely upon the individual patient's 'mental makeup.'"

In his introductory note to Wolfsohn's[6] important paper on the predisposing factors of war psychoneuroses, Col. Pearce Bailey, gives a brief summary of the reports of eight medical officers, detailed for study in shell shock hospitals in England during the summer and fall of 1917 and, among other things, states that in respect to etiology these officers all lay much stress on constitutional predisposition. Wolfsohn's conclusions as to this point are extremely interesting. He studied 100 cases of war psychoneuroses and found that the vast majority were among soldiers who had a neuropathic or psychopathic soil. In 74 per cent. of these cases a family history of neurotic or psychotic stigmata, including insanity, epilepsy, alcoholism and nervousness, was obtained, while a previous neuropathic constitution in the patient himself was present in 72 per cent.

8. Smith and Pear: Shell Shock and Its Lesions, 1917, p. 16.

CAUSATION OF THE SYMPTOMS

When we turn our attention to the occurrences which evoke the symptoms, we again find that they do not differ in kind from those met with in railroad accidents. The intense emotional strain, severe fright, as well as the vivid suggestion of injury are equally present in both instances. These are facts so evident that it seems hardly necessary to emphasize them. Further, the parallelism between shell shock and railroad accident cases becomes more and more apparent the more we study the subject. Ames,[9] for instance, states that "war shock never develops in a sleeping man when a shell bursts near him," a fact which is equally true of persons asleep at the time of railroad accidents. He tells us further that "crack regiments have fewer men coming down with war shock as do old regiments with long traditions of pride." No doubt the reason is that in such regiments neuropathic individuals have been largely eliminated.

Other facts in close accord with our knowledge of the hysteria of civil life are also presented by shell shock. Thus Ames states that throughout the war it has been a matter of continuous comment that *wounded men* did not have war shock, a fact in keeping with the absence of hysterical symptoms in the physical injuries of railroad accidents. Again, Ames states that the large percentage of war shock cases have their onset some time after the shock, some of the men being for several days without any symptoms at all. Here we have again an exact parallel of the fact observed in railroad cases, namely, that time is necessary for the suggestion of injury to become operative. Other facts are equally significant; for example, Ames tells us that among officers there is a relatively smaller percentage than among privates. MacCurdy[10] in his discussion of Ames' paper stated among other things that the paraplegias, the blindness, the mutism, tics, etc., occur preponderately among the private soldiers and further said that this corresponds to the experience in civil life, where functional palsies are rarely met with outside of dispensary practice. When officers do suffer, it would appear that they present symptoms largely psychic in nature, just as do the hysterics met with in the upper classes and upper middle classes in civil life.

FURTHER OBSERVATIONS

Many other facts suggestive of the psychology of shell shock might be added. For instance, *prisoners of war* do not have shell shock; no doubt partly because to a hysterical subject to be a prisoner of war implies safety to life and limb, immunity from the dangers of

9. Ames: J. A. M. A., **69**:2145, 1917.
10. MacCurdy: J. A. M. A., **69**:2146, 1917.

battle; at least for the time being. Again, *wounded men,* as already stated, do not have shell shock; a wound in a hysterical subject implies removal from the front; dismissal, temporary or permanent. Gaupp, quoted by Elliot Smith and Pear,[8] states, in discussing cases in which nervous trouble, uncontrollable in nature and intensity, had led to the patients being kept in German hospitals for months, that it was sometimes found that the mental foundation which was a causal factor of these troubles was a more or less conscious anxiety concerning the possibility of a return to the front. In short, we have here a series of facts more or less parallel to those noted in the accident cases of civil life in which both the evoking of the symptoms and their persistence are dependent on suggestions. These suggestions are often doubtless subconscious in their operation, at least they are not frankly admitted by the individual. Finally, the causes cease to be operative the moment that the suggestion disappears, as witness the practically immediate recovery of the hysterical claimants for damages when litigation ceases and the claims have been disposed of.

PREVENTION OF WAR SHOCK

Without further consideration, let us turn our attention next to the important question of prevention. Can war shock be prevented, or, if it cannot be prevented, can it be minimized? Obviously, there is only one remedy, and that is as rigid an exclusion as possible of neurotic and neuropathic individuals from the ranks. Others, for example, Osler and Salmon, have expressed themselves emphatically on this point. It is the duty of the medical examining boards and especially of the medical advisory boards to eliminate such persons with the utmost care. Surely we should profit by the experience of the countries that have preceded us in the war, notably England, and as far as possible prevent the accession to the ranks of material not only worthless for actual fighting, but which greatly reduces the efficiency of the Army and clogs and clutters its hospitals.

SUGGESTIONS AS TO TREATMENT

Next, what shall we say as to the treatment of cases after they have occurred? In considering this question, it is most interesting to note the change which took place in Paris previous to the war, both in the management of hysteria and in the results achieved. This change followed Babinski's remarkable and convincing interpretation of the symptoms. The patients now ceased to be made the objects of suggestive medical studies, of interest and of special care; they no longer occupied the center of the stage; convulsions, gross palsies or

other manifestations were alike ignored as though they had no existence, and the inevitable result followed. In the summer of 1913, Babinski stated to me that major hysteria had disappeared from the hospitals of Paris. This is a remarkable fact and one which must influence our attitude toward and our treatment of the hysterias of war.

The attitude adopted in France is most interesting and significant, and may be properly regarded as just and final.

At a joint meeting of the Neurological Society of Paris and the chiefs of the military neurological and psychiatric centers, on Dec. 15, 1916,[11] a discussion was held on the relation of the neuroses and psychoses of war to dismissal from the service, to unfitness for service and to gratuities. The discussion was most elaborate and detailed. Those participating in the part on the neuroses were Grasset, Babinski, Léri, Souques, Henry Meige, Laignel-Lavastine, Dide, Chiray and others. After its completion, the following conclusions were adopted:

1. For symptoms purely hysteric (pithiatic) neither dismissal from the service nor gratuities.

2. For cases in which hysteric (pithiatic) symptoms are associated with organic affections, either physiopathic or mental, no account is to be taken of the hysteric manifestations in the evaluation of the degree of the incapacity.

3. For physiopathic disturbances (nervous disturbances termed reflex) consecutive to traumatism of war and refractory to a prolonged treatment: auxiliary service or temporary dismissal with gratuity in amount proporioned to the functional interference.

4. For neurasthenic states, well marked, even without objective or mental disturbance; most often auxiliary service, exceptionally temporary dismissal with or without gratuities.

These conclusions need no comment and no explanation; least of all do they need a defense.

The most potent remedy for shell shock is, as has already been emphasized, its prevention by the exclusion of individuals unfit for service. The most satisfactory plan of dealing with it after it has occurred, would seem to be that instituted by the English. At first the cases were sent from the evacuation hospitals in France to special hospitals in England. Here general physiological measures, virtually a rest treatment, with psychotherapy, occupation and what not were instituted, but with results that were only partially successful, and even when patients were supposed to have been restored, they not infrequently relapsed on the way back to the front.

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11. Revue Neurologique, November-December, 1916, p. 750.

As mentioned by Bailey:[6]

Quite recently the attitude in respect to the management of this condition has undergone a marked change. Eighty-five per cent. of all shell shock patients are not now returned to England at all. It has been found much better to treat them nearer the front, and any release from military discipline is regarded as unfavorable for recovery. Moreover, the general methods of treatment, such as diversional occupation, extra diet and entertainments, have been replaced by more rapid and much more satisfactory procedures. Electricity given for psychic effect, which at first was disapproved, has been found to be a valuable agent. This is accompanied by strong persuasion. Cases are reported cured in this way in a few hours which had formerly endured for months, and had resisted all other methods. The personality of the medical officer is a most important factor.

It is important to note that as regards dismissal from the service, the position of the English is identical with that of the French. At times a rational explanation of the symptoms to the patient has been efficacious in bringing about their disappearance. Elliot Smith and Pear[8] state:

It has repeatedly happened that as soon as the patient was asked about his troubles, he made a full statement of all that was troubling him and was obviously relieved to confess his worries to some one who took an intelligent interest in his welfare.

An intelligent man of strong will, whose social relations have hitherto been normal and happy, might be temporarily "bowled over" by the emotional stress of the campaign, but after a few explanations he is often set on his feet again.[8]

Psychanalysis has been advocated by Adrian and Yealland, and to a less degree by Eder and by Elliot Smith and Pear. Hypnotism has been used by Eder and others. In the Paris discussion, Lortat-Jacob stated, that he obtained good results by appealing to the individual's sense of honor and by publicly administering an oath. However, after all is said and done, in a given number of cases, the symptoms persist.

Salmon[12] says:

It is evident that the outcome of the war neuroses is good from a medical point of view and poor from a military point of view. It is the opinion of all those consulted that with the end of the war most cases, even the most severe, will speedily recover, those who fail to being the constitutionally neurotic and patients who have been so badly managed that very unfavorable habit-reactions have developed. This cheering fact brings little consolation, however, to those who are chiefly concerned with the wastage of fighting men. The lesson to be learned from the British results seems clear — that treatment by medical officers with special training in psychiatry should be made available just as near the front as military exigency will permit and that patients who cannot

12. Salmon, T. W.: The Care and Treatment of Mental Diseases and War Neuroses (Shell Shock) in the British Army, Ment. Hyg., **1**:509, 1917.

be reached at this point should be treated in special hospitals in France until it is apparent that they cannot be returned to the firing lines. *As soon as this fact is established military needs and humanitarian ends coincide.* Patients should then be sent home as soon as possible.

Should we in this group of cases, institute an elaborate physiologic, a Weir Mitchell plan of treatment? I should answer no; at least, not for an extended period of time. Further, under no circumstances should the patients be released from military discipline, although for obvious reasons it may prove best not to attempt to utilize them again at the front. It would also to me seem wisest after an interval to inform them of this decision. Forsyth tells us that "if the patient knows he will not return to trench warfare, he will make a more rapid recovery." Such cases may later prove useful in auxiliary service.

After all, however, the proper remedy for shell shock is the strict exclusion from the draft of material alike unserviceable, contaminating and demoralizing and most expensive from the point of view of military economics. Of course, the line should be drawn as sharply as possible between out and out malingering and hysteria. In this connection the willingness to deceive and exaggerate, not infrequently seen in hysterical subjects should also be borne in mind. However, with Gaupp, I am not inclined to look on the pure hysteric as necessarily a malingerer. The hysterical person is one burdened with a defective organization, which is, as I have already phrased it, expressive of a biologic inferiority.

Finally, it should be remembered that the conclusions of the Neurological Society of Paris and of the chiefs of the Neurological and Psychiatric Centers do no injustice to the sufferers from pure nervous exhaustion. That under the severe nervous overstrain of war, fatigue symptoms should present themselves and often in a pronounced degree, is no more than could have been expected; but this is a very different matter from shell shock.

COMPLETE DIVISION OF THE SPINAL CORD IN LOWER DORSAL REGION

A CASE WITH CONSERVATION OF SPINAL REFLEXES BELOW LEVEL OF LESION *

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SUMMARY OF CASE HISTORY

An adult man rendered totally paraplegic following fracture of the tenth dorsal spine and consequent direct injury to the cord. First observation one year and three months after injury. Examination disclosed exaggerated inferior tendon reflexes, accompanied by pathologic pyramidal tract signs, marked defense reactions, preserved muscle tonus and patellar clonus. Total absence of voluntary motion in lower extremities. Involuntary action of sphincters, decubitus ulcers over both hips. Absolute anesthesia below the ninth and tenth dorsal radicular skin distribution. Because of the abnormal motor phenomena a compression of the cord was suspected, and a laminectomy performed by Dr. Emmet Rixford, Feb. 3, 1917. A complete division of the cord tissue proper was found. The ends of both cord fragments were trimmed off and preserved for future examination. An effort to suture the two ends of the spinal cord was made and found impossible. Reexamination Feb. 22, 1917, nineteen days after operation, showed the same clinical signs as before operation.

History.—B. F. H., aged 46, on Oct. 12, 1915, fell a distance of 8 feet from a walk plank placed over two ladders; he landed on a carpeted floor; had no recollection of the manner of his fall, his last remembrance of the occasion being the swaying of the ladders toward the wall which he was painting. No one saw him fall, but he was found unconscious immediately afterward; he remained so for about 20 minutes; on awakening he complained of severe pain in the pit of his stomach, felt "dead" below the waist, and was unable to move any of his muscles below the waist; sensation was abolished below the same line. After the injury there was retention of urine, necessitating catheterization for about ten days; a mild cystitis was set up which subsided in a few weeks; this retention was succeeded by loss of voluntary control which has persisted to date. The urine dribbles away but also comes at times in quantities; there is a sensation of pain in the region of the bladder, which precedes urina-

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* Read at the Annual Meeting of the American Neurological Association, Atlantic City, N. J., May, 1918.

tion. Defecation has been involuntary since the accident, although bowel movements have not been continuous. It is necessary to take large quantities of physics to produce a motion. Often the simple insertion of an enema tube will be followed by a bowel movement. Enemas are not found to be as efficacious as the foregoing. Burning pain in the epigastrium and along the costal margin continued to be very severe after the injury requiring morphin.

Three days after the fall the patient was operated on by Dr. George White of Sacramento. The exact nature of the operation is unknown to patient, but he was told that the operation was one of decompression. An excellent operative recovery was made, but no improvement in motor or sensory function resulted. Following an attack of malaria six weeks after leaving hospital, decubitus ulcers developed over both trochanters and in the gluteal fold of the left side, and these ulcers have persisted to the present time. In the past year the condition has been practically unchanged. Subjective sensation of burning and tingling are said to be present in the soles of the feet, in the epigastrium and along the costal margins. The general physical condition has remained good, weight has been constant or slightly increased, appetite is good, and sleep excellent. The patient states that within a month after injury "life" came back into lower extremities — there were twitchings observed in both legs; and definite movements were said to have taken place about two months later. These movements were a drawing up of the lower extremities; they increased in force and extent up to within six or eight months from the present date — January, 1917.

Neurologic Examination.—This was made, Jan. 29, 1917. It revealed a total paraplegia of the spastic type, no voluntary movements at the ankle, knee or hip joints, some contraction of the abdominal muscles most marked in the upper part of the abdomen. Inspection of the dorsal spine presents a gibbus at the ninth to tenth dorsal spines. No muscular atrophy in the lower extremities is noted that cannot be accounted for by disuse, with the possible exception in the right thigh muscles where there may be some true atrophy; this is more marked posteriorly. Decubitus ulcers present over both hips.

Reflexes: Patellar and Achilles' tendon reflexes both present and very active. Babinski, Oppenheim and Gordon reflexes positive. Ankle and patellar clonus is active but inhibited almost immediately by spasm of the quadriceps group.

Sensibility: Superficial and deep sensibility totally lost below the level of the ninth to tenth dorsal segments; the sensibility for pain and temperature is lost about from 4 to 5 cm. above the loss for light touch, and the levels vary on the two sides of the body as shown on the accompanying chart. After the examination has been continued for a certain time the levels of anesthesia are found lower at the end of the examination as compared with the beginning of the examination. The levels are constantly higher on the left side of the body than on the right — this is particularly well marked posteriorly. It is noteworthy that no areas of distinct hyposensibility or hypersensibility exist at the level of anesthesia, which appears sharp and well defined. Position of great toe not recognized. Pressure sense appears to be perceived at first, but it is a question whether patient does not sense certain reflex movements. These reflex movements of the nature of defense reactions are constantly present by stimulation of both the plantar and dorsal surface of both feet, most readily by pinching the skin and by pin prick, but also, though to a lesser extent, by heat and cold. They consist of an exaggeration of the tendency of the great toes to extension and flexion at the ankle, knee and hip. Excitation of the skin of the leg and thigh cause less marked reactions excepting in the right quadriceps region.

Roentgen-Ray Examination.—Made by Dr. Walter Boardman, Jan. 25, 1917. "Examination shows narrowing of the body of the tenth dorsal with obliteration of the tenth intervertebral space and angulation of the spine at this spot."

Impression: Traumatic injury of spinal cord above the lumbar enlargement and opposite the level of the tenth dorsal vertebra. The possibility of a compression must be considered because of the paraplegia of the spastic type and the prominence of the defense reactions. Exploratory laminectomy was advised.

Operation.—The operation was performed by Dr. Emmet Rixford, Feb. 3, 1917. Dr. Rixford's notes on the operation follow:

> Assistant, Dr. Melville E. Rumwell. One lamina removed below the gibbus. Evidence of considerable new growth of bone at the site of Dr. White's laminectomy, so that the cord was very well protected. The cord being exposed above and below it was found to be completely cut off at the

Fig. 1.—Constant tendency to extension of the great toes in the resting stage.

level of the gibbus. It was noted that there was cerebrospinal fluid within the dura below the point of injury. It, therefore, seemed probable that there was connection across, but this could not be found by means of a probe passed from either above or below. The scar which united the dura was then split longitudinally and an effort made to trace connection between the upper and lower dural sacs, but this was not successful. The dura was then lifted off the bone and the upper part turned upward and the lower downward. With a chisel, a considerable amount of the bone of the anterior wall of the canal was cut away, especially the upper edge of the eleventh dorsal vertebra. It would appear that the injury consisted of a driving forward of the tenth on the eleventh dorsal vertebra. The cord was absolutely cut across with no detectable fibers of communication. When at the lower border of the wound the cord was touched, the legs contracted. Evidently the injury was chiefly above the lumbar enlargement. There was no pulsation of the dura, but it expanded and contracted with respiration. This was detected also after the dura had been lifted off the bone and the parts

definitely separated. It was therefore quite evident that the pulsation and variation in pressure due to respiration was a local matter in the cord rather than the result of transmission from the brain. The dura was drawn together with catgut and an attempt made to suture the cord. The ends of both fragments were trimmed off and preserved for examination. Two catgut sutures were then passed through the spinal cord in an effort to draw the ends together, but it was not possible to approximate them within less than one-half inch.

Condition After Operation.—The patient made a good operative recovery. Re-examination neurologically, Feb. 22, 1917, nineteen days after operation, showed practically the same clinical findings as before the operation. The following details were noted: When questioned as to sensation in the lower extremities, the patient states that he feels tingling, numbness, sensations of heat and cold and also pain at times in the feet, legs and thighs of both

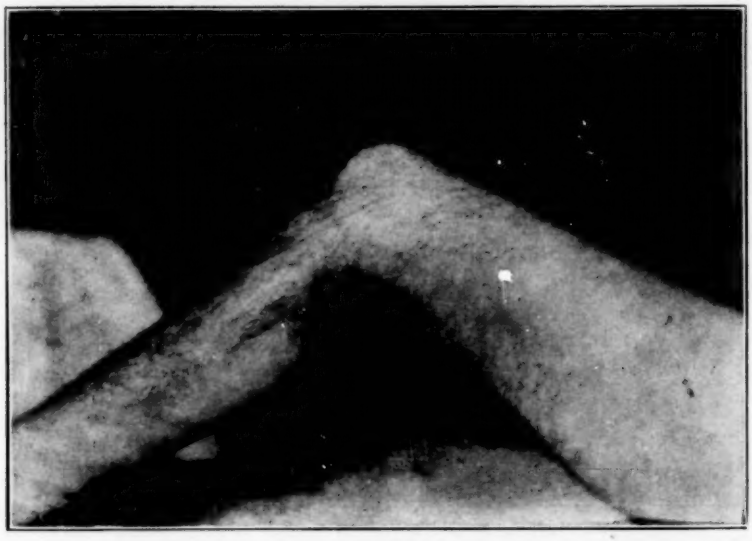


Fig. 2.—Flexor response by defense movements.

extremities. He states that he can feel the breeze from an electric fan in the room. Re-examination of the sensibility revealed the same levels of anesthesia for cutaneous sensation. Deep sensibility lost, tested by the Luer fork for osseous sensibility, by pressure and by notion of position. The subjective sensory impressions were judged to be the hallucinations of sensation and also due to transmitted impulses from reflex defense movements.

Reflexes: Babinski and Schaeffer reflexes are present bilaterally and constantly; Oppenheim present, questionably, however, on the left side. Gordon and Mendel-Bechterew reflexes are variable, at times absent. Patellar and ankle jerks very lively.

Muscular System: A comparative atrophy existed in the paralyzed limbs and rump, but was of the degree which is found in emaciation or disuse. Electric examination by both faradic and galvanic currents showed response of the muscles without qualitative change. There was, however, a relative hyperexcitability to both forms of current, amounts of galvanic current as high as 10, 15 or 25 ma. being necessary to produce muscular contraction. The

external popliteal nerve was excitable to the electric current. Tonus: The muscle tone was found either normal or increased.

Reflex Defense Movements: As the patient lay in the supine position the lower extremities were in extension, but it was noteworthy that the great toes were slightly extended rather than partially flexed as seen in flaccid paralysis. On irritation of the plantar surface of the feet this extension was so markedly increased that the great toes were at an approximate right angle to the plane of the foot. Repeated examinations of the plantar, tibial and calf reflexes gave the impression that the Babinski sign was the most frequently positive, the Oppenheim less often so and the Gordon reflex was at times evidenced by flexion rather than extension of the great toes. As to the reflex defense movements proper, they were elicited most conveniently by pin prick. It was not established that touch produced these reflexes except pinching the integument or rather pressure. As was the case in previous examinations, temperature also

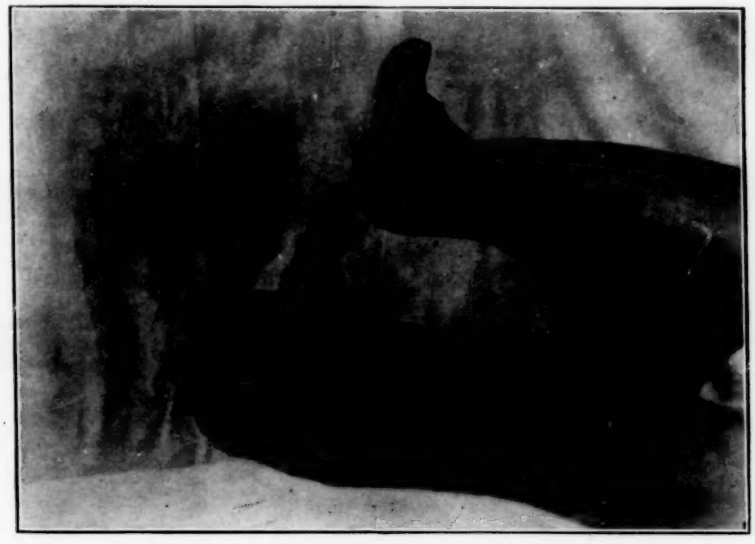
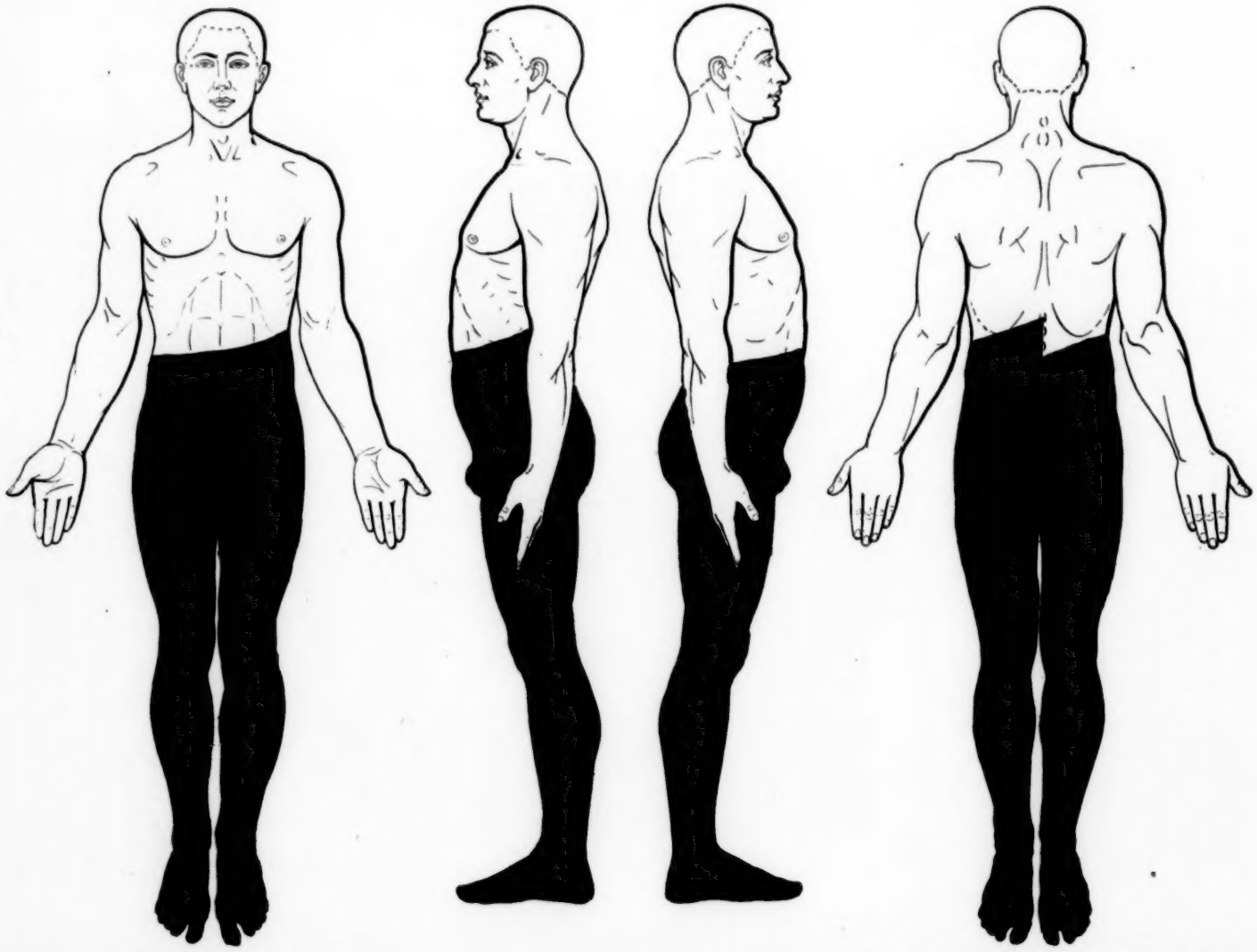


Fig. 3.—Extensior reflex in the Babinski sign.

produced the defense movements. The flexor sign of Marie, *signe des raccourcisseurs,* was present. By pin prick different surfaces of the lower extremities, anteriorly, posteriorly and laterally, were stimulated, with the result that the movements were generally of the same kind, irrespective of the site of stimulation, namely, in flexion. The thigh was flexed on the pelvis, the leg on the thigh, and the foot dorsally flexed on the leg. The tendons of the sartorius, the adductors, the hamstrings, were seen to contract.

The patient was questioned as to whether the lower extremities were ever forcibly involuntarily extended from the flexed position. This was stated to be sometimes the case. By passive motion of the lower extremities at the different joints there occurred at times a certain rigidity of the member in extension, the knee not being readily bent and the foot plantar flexed. These movements were not as vigorous as the movements of flexion just described. In observing the muscular contractions in the flexor movements, there was observed a concomitant and independent movement and increased tonus in the anterior thigh and calf muscles as if the muscles of the entire lower extremity were brought



Black areas indicate complete sensory loss (superficial and deep sensibility). There is complete absence of sensibility below the level of the ninth and tenth dorsal segments.

into play, but the flexor movements predominating. The flexor and adductor movements of the thigh were vigorous enough to retain the thigh flexed on the pelvis for quite an appreciable length of time after the stimulus has been withdrawn, and held adducted so as not to fall outward by its own weight, but remaining a considerable distance above the level of the bed. The tendons of the adductors and sartorius were seen to stand out boldly leaving between them a considerable fossa. During the examination there was observed a partial erection of the penis. Patient stated that on occasions there was a complete erection, but without any sensation of sexual desire. The state of the anal and vesical sphincters have been previously mentioned and remained the same.

Subsequent Examinations.—The patient was next examined, March 3, 1917, and two days previously also, for the height and localization of areas which, when stimulated, produced defense reactions. It was found that on the anterior aspect of the thigh, these reflexes did not take place when stimulation was applied above the lower third of the thigh or at most above the upper half of the thigh. On the posterior aspect of the extremity and buttocks, however, reflexes took place when points as high as the ischii were stimulated; and in the thigh and leg it can be said to be true that stimulation on the posterior aspect of these portions or the lower extremities, produced more active and strong contractions than stimuli applied to the anterior aspects of the extremities. In the foot, there appeared to be no difference in intensity of reaction on plantar or dorsal stimulation. The patient, after the foregoing examination, returned to his home in the Sacramento valley and was not re-examined until Nov. 17, 1917, and on this date the following note was made: Patient examined in Live Oak, Calif.; with the exception of a complication bladder infection, the condition remains about the same. In particular, contra-lateral reflexes were tested for, but neither defense movements, the Babinski toe reflex nor contralateral adductor reflexes, were noted in the contralateral limb, following any kind of stimuli to the one lower extremity.

The patient was next examined, Jan. 1, 1918. The neurologic status was practically unchanged at this time. The general condition of the patient, however, was not so satisfactory, as the bladder infection, in spite of extreme care, appeared to be progressive and was suspected of ascending to the kidneys. Particular attention was directed on this examination to the state of the skin reflexes and the existence or nonexistence of contralateral reflexes. No contralateral responses were observed. The plantar reflexes were only present on the side stimulated; also the defense reactions were present only on the side stimulated, and in eliciting the patellar reflex and percussing the different bony prominences in the lower extremities there were no contralateral adductor responses. The left cremasteric reflex was definitely present; on the right side a slow vermicular contraction of the scrotal musculature was observed differing from the quick cremaster reflex as seen on the opposite side (Dartos reflex). The abdominal reflexes were not found definitely present. The Babinski, Oppenheim, Rossolimo and Gordon reflexes were found to be present.

Final Result.—By practice and experience the patient was, to a certain extent, able by taking advantage of his own defense reflex movements and consequent rigid and fixed position of his lower limbs, to utilize these movements in assisting himself to changes in position. While sitting in a wheel chair he was able to clear his thighs and buttocks from the seat of the chair, the knees being rigid and the ankles fixed for support. In this manner by a pulley arrangement above his bed he was able to clear himself from his chair, swing on to the bed and content himself with the idea that he had a certain return of motion more or less voluntary in the affected extremities.

LITERATURE

Bastian,[1] in an article written in 1890, stated that the prevailing notion of this time was that in man, after a total transverse lesion of the spinal cord, the reflexes were exaggerated below the lesion following the period of shock. This notion was based on the experiments of physiologists. Bastian's contention, based on his own personal experiences in cases of transverse softenings of the cord and references to the literature of the subject, was opposed to this view. In 1882, in an article in Quain's Dictionary of Medicine (page 1480) he had already expressed a very definite opinion on this subject, based on an observation of three cases of total transverse lesions of the cord (softening). In his later article he reported four cases with verification by necropsy and study of ascending and descending degenerations. In this series the longest period of duration of the paralysis was seventeen weeks. Bastian states that, although there was not in all of these cases a record of the condition of the reflexes up to the termination of the illness, his memory enabled him to say most definitely that the limbs in all remained in a condition of flaccid paralysis with no signs of rigidity even up to the end. This condition of areflexia with flaccidity and sensory paralysis was hereafter known as Bastian's Law in complete lesions of the cord. The explanation of the phenomenon was that the autonomy of the spinal cord decreased as we ascend the vertebrate scale; and that further loss of pain sensation was the determining factor which brought about the loss of reflexes. This loss included both the cremasteric and abdominal reflexes. It is, however, interesting to note that Bastian admitted the persistence in the plantar reflex and also to a certain extent the vesical and rectal sphincter action evidenced by the periodical discharge of urine in small quantities, and the loss of power to control reflex action concerned in defecation when this action had been strongly excited as by laxatives. Furthermore, the persistence of the idiomuscular contraction due to mechanical stimulation was noted, but explained as not being a true reflex.

Bastian's Law, accepted by Ludwig Bruns[2] and sometimes called the Bastian-Bruns Law, was, however, the subject of considerable controversy. Oppenheim,[3] in his textbook (1913), and particularly Lapinsky,[4] who gives a large bibliography on the subject and his

1. Bastian, H. Charlton: On the Symptomatology of Total Transverse Lesions of the Spinal Cord, Tr. Royal Med. and Chir. Soc., London, **73**:151, 1890.

2. Bruns, Ludwig: Arch. f. Psychiat., **25**:759, 1893.

3. Oppenheim, H.: Lehrbuch der Nerven-Krankheiten, **1**:136, 1913.

4. Lapinski, Michael: Arch. f. Psychiat., **42**:55, 1906.

own personal experiences on clinical observations and animal experimentation, discusses the various observations and opinions. This latter author and Henneburg,[5] also Kausch[6] (1901), reported cases of complete transverse cord lesions above the lumbar enlargement which were followed by preserved tonicity and tendon reflexes and appeared definitely to contradict Bastian's Law. Previously, certain observers had intimated that skin reflexes were persistent—but few, if any, undisputed cases of preserved tendon reflexes were reported. Jolly,[7] however, also reported such a condition. The condition described by Bastian appeared to be explained then by lesions affecting directly the reflex centers, shock, extensive alterations in the cord, blood and lymph circulation disturbances, tearing of posterior roots, increased cerebrospinal fluid pressure, or chronic degenerative changes in muscles, peripheral nerves, ganglion cells or posterior roots.

RECENT CONTRIBUTIONS

Since the beginning of the great war there have appeared numerous observations of complete traumatic transverse cord section, and in the great interest which attaches to the clinical manifestations of this condition there have been many careful and detailed reports. Of these observations, the following may be mentioned:

Observation of Dejerine and Long[8]: Cervical paraplegia of traumatic origin, motor and sensory paralysis below the lesion, abolition of tendon reflexes, conservation of cutaneous reflexes. The plantar reflex occurred in this case always in flexion which was interpreted by Dejerine to mean that the pathologic extension reflex of the great toe was not conditioned solely by pyramidal tract degeneration, but for its production an intervention of superior centers was necessary, such as cortical, subcortical and mesencephalic centers.

Observations of Dejerine and Mouzon[9] covered seven cases: in all but one, absence of tendon reflexes. Preservation of defense reactions and cutaneous plantar reflex. This plantar reflex was in flexion confirming Dejerine in his previous notion of the supermedullary factor in the production of the extension reflex of the great toe. Report of a further patient (Case 10) presenting crossed defense reflex reactions.

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5. Henneberg: Charité—Ann., **31**:161, 1907.

6. Kausch: Mitteilung aus den Grenzgebieten der Med. u. Chir., **7**:541, 1901.

7. Jolly: Neurol. Centralbl., **21**:334, 1902.

8. Dejerine and Long: Soc. de Neurologie, Seance du 12, Decembre, 1912, Rev. neurol., **24**:769, 1912.

9. Dejerine, James A., and Mouzon, J.: Sur L'Etat des Réflexes dans les Sections Completes de la Moelle Epinière, Rev. neurol., **28**:155, 1914-1915, ibid., 201.

Observation of Gustav Roussy:[10] Total destruction in the region of the lumbar enlargement of cord in two cases. Flaccid paraplegia with anesthesia and loss of defense reactions and cutaneous reactions.

Observation of Claude and Petit[11]—three cases: Absence of all reflexes, complete anesthesia below the lesion. The longest duration of life after injury was one month and three days.

Observation of Claude and Lhermitte:[12] Destruction at the eleventh dorsal segment. Duration of life after injury, 136 days. Preservation of tendon and skin reflexes. The plantar reflex was in extension, but later changed to flexion.

Observation of Guillain and Barre[13]—fifteen cases: Longest duration of life was forty-one days—in most of the cases, considerably shorter. In all but one, loss of tendon reflexes, plantar reflex, flexion of great toe. Defense reactions present in but three cases.

Observation of Head and Riddock[14]—eight cases: Divides the course which the cases run into three stages: 1. Stage of flaccidity. 2. Stage of reflex activity. 3. The stage of gradual failure of reflex functions. The contents of the bladder and rectum may be voided automatically. A widespread reflex action consisting of flexor spasm of lower extremities, abdominal wall, evacuation of bladder and sweating is designated as "mass reflex" in complete section. The flexor muscles in all phases show more tone than do their antagonists. Comparing the manifestations of complete and incomplete lesions, the authors state that there are no manifestations by which we can be certain that the spinal cord has been anatomically divided. But certain manifestations were found in incomplete lesions, not occurring in complete lesions; of such, noteworthy were the difference in character of flexor responses as compared with the "mass reflex"; a slower relaxation phase in the knee jerks; no obvious tonus difference in flexor and extensor groups; and especially the presence of extensor responses designated as postural reflexes, dependent on the integrity

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10. Roussy, Gustav: Deux Cas de Section de la Moelle par Plaie de Guerre suivis d'Autopsie, Soc. de Neurologie, Seance du 5, Novembre, 1914, Rev. neurol., **28**:206, 1914-1915.

11. Claude et Petit: Trois cas de Section Complete de la Moelle Epinière par Balle, Soc. de Neurologie, Seance du 3, Decembre, 1914, Rev. neurol., **28**: 217, 1914-1915.

12. Claude et Lhermitte: Les Reflexes Tendinaux et Cutanes, les Mouvements de Defense et d'Automatism dans la Section Totale de la Moelle d'apres une Observations, Anatomo-Clinique Ann. de méd., **3**:407, 1916.

13. Guillian et Bare: Etude Anatomo-Clinique de Quinze Cas de Section Totale de la Moelle, Ann. de Méd., **4**:178, 1917.

14. Head and Riddoch: The Reflex Functions of the Completely Divided Spinal Cord in Man, Compared with Those Associated with Less Severe Lesions, Brain, **40,** Parts 2-3, 1918.

of certain descending propriospinal paths. Examples are homolateral or bilateral extension of the lower extremities by stimulation of upper receptive fields or by gently pressing on the sole when the limb is passively flexed (extensor thrust). Further, in these cases of incomplete division, muscular action of the ipsilateral limb is diphasic in character (flexor and extensor) as compared with the undiphasic type (flexor) as seen in complete lesions. In certain cases of incomplete lesions the action is comparable to the steppage movement of the spinal dog. Tonus of all the muscles is constantly below normal in the resting state after total transection.

Two important articles on spinal injuries in warfare have recently appeared by Holmes and by Collier. Gordon Holmes[15] is of the opinion that in total transverse lesions of the cord the knee and ankle jerks are probably permanently absent. Preservation of tone in the muscles is an indication that some improvement may be expected. The amount of reflex movement obtained by stimulation of the soles varies more or less inversely with the severity of the injury. In less severe lesions, in the early stages, he speaks of a unisegmental reflex of flexion of the toes, or flexion of the toes associated with contraction of the hamstrings by stimulation of the receptive field of the first sacral segment in the sole.

James Collier[16] postulates four consecutive stages of plantar reflexes following a transverse cord lesion: "1. An initial extensor response. 2. Either a complete absence of any reflex which may be the result of shock or of isolation alteration, or a reduced flexion reflex which is the result of isolation alteration coming on rapidly. 3. The extensor response which when persistent is indicative of a less severe lesion or alternatively of more recovery than the reduced flexion reflex. 4. The normal reflex which returns when recovery is complete."

COMMENT

The case reported in this paper is a striking example of spinal automatism after cord transection. It is noteworthy particularly because of the following considerations:

1. Long duration of life (patient is still alive, September, 1918).
2. Persistence of the extensor toe reflex.
3. Exaggerated patellar and ankle jerks.
4. Patellar clonus.
5. Automatic bladder and rectum.

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15. Holmes, Gordon: Goulstonian Lectures, Brit. Med. Jour., **2**:769, 815, 855.
16. Collier, James: Gunshot Wounds and Injuries of the Spinal Cord, Lancet, London, **1**:711, 1916.

6. Preserved muscle tonus of normal or increased degree. This state of tonicity is emphasized by the constant tendency to extension of the great toes in the resting stage, there being no contractures or joint complications present.

7. Presence of extensor as well as flexor responses in the same extremity. Head and Riddock report contralateral extensor responses accompanying flexor movements in one extremity. Such contralateral responses, although not searched for, were not noted in this case.

8. Concomitant flexor and extensor responses of unequal intensity in the muscles of the same extremity. This observation would be in opposition to the theory of reciprocal innervation of antagonistic muscles. Tilney has recently stated (personal communication) that in physiologic experimentation, myographic tracings of flexor and extensor groups of an extremity when the whole limb is set into action appear to throw some doubt on the correctness of this theory.

NEUROPSYCHIATRY IN RECRUITING AND CANTONMENT *

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The topic assigned to me is neuropsychiatry in recruiting and cantonment. However, as my experience has lain chiefly with the latter, I shall confine my remarks to neuropsychiatric examinations in the cantonment.

The neuropsychiatric work in the cantonment presents special features which are quite different from those in military hospitals. In the latter, neuropsychiatry is similar to that in civil hospitals, or civil practice.

In base hospitals, one finds obvious disorders, chiefly. These have been referred for examination and treatment, by the regimental surgeons, who are, as a rule, not very familiar with such conditions.

In the cantonment, the same class of cases is met with, but, in addition, one encounters a special type, which rarely, if ever, finds its way to the base hospital, by reason of the fact that the true character of such disorders is not recognized and very frequently they are regarded as entirely foreign conditions, such as malingering, carelessness, shiftlessness, delinquency, inattention to duty, etc.

TYPES OF DISEASES OBSERVED

It is scarcely necessary to burden you with the statistics, which would not essentially differ from those already given, and are not dissimilar from those found in civil life, only modified by the natural differences, such as age, sex, climate, geographic conditions, care in selection, etc. Suffice it to say that one encounters gross organic nervous diseases, such as early tabes, paresis, multiple sclerosis, peripheral neuritis, neurosyphilis, residual from old poliomyelitis, occasional brain tumor and other conditions on the one hand, and, on the other, well developed dementia praecox, manic-depressive psychoses, mental deficiency, alcoholism, drug addiction, epilepsy and well marked psychoneuroses.

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Between these two extremes, there is a host of intermediary conditions, such as mild neuroses and psychoneuroses, neurasthenias, anxiety states, hysterias and hysteroid episode, epileptoid conditions, psychopathic personalities, inferiors, military misfits, conscientious objectors and otherwise near-normal individuals. This group of cases is, of course, the most baffling and taxes the ingenuity and resourcefulness of the examiner to the utmost. Moreover, they constitute a greater menace to the military organization by lowering the efficiency and impairing the general morale, than do the obviously diseased types which are readily recognized and without great difficulty eliminated. They are a constant source of annoyance and trouble to the officers, forming the larger number of the absentees, the discontented, the inefficients, the inmates of the guard house and the frequenters of the regimental infirmary.

These are the cases which complain of being dizzy, faint and bewildered at critical moments, while in training or maneuvers.

The psychoneurotic forms the largest and most important of this intermediary group. As they present themselves in the cantonment, and based on the duration and mode of onset of their malady, they may be classified, for practical purposes, into three groups:

The first group consists of those in whom the disease existed long before their entrance into the Army. These, as a rule, have neuropathic family history and have been unstable and more or less shiftless, long prior to the onset of the neurosis. Curiously enough, many of the neurotics of this type are found among the enlisted men who have been advised to enter the Army by physicians, with the assurance that the discipline and outdoor life would correct their trouble. Others have enlisted without such advice, although they themselves have entertained the hope that they would derive benefit from military service. According to their own statements, all seem to have felt quite improved for a short period immediately after their enlistment. However, this amelioration has been of brief duration. My personal experience has been that this type of neurotic is quite unfit for military service and that the entrance of such individuals has been detrimental to themselves as well as to the Army.

The second group comprises those in whom the disease arises while they are in the Army, following an accident, injury or some somatic disorder, such as rheumatism, bronchitis, etc. The neurosis is referred to and intimately connected with the injury or disease. These men, as a rule, have a better family and personal history than the former group and recovery of a small proportion may be looked for in camp.

The third group is made up of men whose antecedents have been apparently free from neurotic taint and in whom the hysterical conversion has not been definitely established, remaining latent or just beneath the surface and usually corrigible by educative and environmental influences.

AUTHOR'S OBSERVATION REGARDING MALINGERING

Most of the neurotics have been regarded as malingerers. Some of them part of the time and many all of the time. Without going into the general question of malingering, I should like to state that my experience has been at variance with that of some others. In the examination of thousands of cases, I have been able to convince myself that malingering, pure and simple, could be established in only four cases. Three of these simulated mental disease and one epilepsy. Of course, most of the psychoneurotics consciously exaggerate their symptoms, which largely contributes to the erroneous notion that they are malingerers. Careful examination and analysis of most of these will, however, reveal a pathologic background.

METHODS OF APPROACH

Before going into the discussion of the very mild and borderline cases, I should like to make a few observations as to the method of approach in neuropsychiatric examinations in cantonments. Of course, one hardly expects to be received with enthusiasm when one arrives at a camp to do neuropsychiatric work. There appears to be, on the contrary, with very few exceptions, a lack of interest, or an indifference, or a manifest skepticism; not infrequently there is a passive, or even an active antagonism to any examination of this sort. Strangely enough, the medical officers are the chief passive obstacles, and in the beginning, very little assistance or cooperation can be obtained from them. So, the first effort at a cantonment must be directed to the officers, especially the medical officers, with the view of demonstrating to them the practical value of such examination, in order to enlist their sympathy and cooperation. They must first be made to appreciate the importance of neuropsychiatric examinations. In order to accomplish this, one frequently has to resort to tact, persuasion or even strategy.

In dealing with this situation of passive resistance, it is desirable in the beginning to report as unfit for military service only those men with obvious nervous or mental disturbances, and in whom one can show the disorder in its early phases and point out how the disease influences the soldiers' conduct and efficiency. For example, the painstaking demonstration of an early case of tabes, of disseminated scle-

rosis, of paresis, of dementia praecox or of manic-depressive psychosis, which has been unrecognized and unsuspected, will go a great way in rousing the interest and even the enthusiasm of the medical officers. The greatest help to the neuropsychiatrist comes, however, from the line officer, and particularly the company commander. It may seem strange, but it is, nevertheless, true, that the line officers appreciate the value of neuropsychiatric examinations much more readily than do the medical officers.

The explanation for this may be found in the fact that the line officer rates his men in terms of conduct, behavior and efficiency, which, after all, is equivalent to the standard of the neuropsychiatrist who estimates conduct from the mental qualities and make-up of the individual. If a company of soldiers be carefully examined from the neuropsychiatric standpoint, and the results compared with the reports furnished by the company commander of those men in his organization who have been inapt, inefficient, slow, awkward, easily fatigued, delinquent, insubordinate and difficult to get along with, a striking parallelism will be found between the two sets of observations.

Experiences of this character naturally bring the line officer very close to the neuropsychiatrist. The officer eagerly seeks counsel and aid, as he at once recognizes that both he and the examiner are dealing with similar problems. The neuropsychiatrist may be called on by the commanding officer to give advice in the matter of discipline of the force and even in the rating of the efficiency of his officers, etc.

VALUE OF EDUCATIONAL PROPAGANDA

In addition to all this, educational propaganda in the way of popular talks and discussion, will render the work of the neuropsychiatrist much more agreeable and profitable in a military camp. I have referred to this matter perhaps at some length, for the purpose of introducing the subject of applied psychiatry, or preventive psychiatry if you choose, which is, I believe, the most important phase of neuropsychiatric work in the Army.

It must be remembered that in a hastily formed army like ours, especially under a system of draft, there is a great demand on the individual soldier for a rapid and violent adjustment. Men without any previous military experience, drawn from every walk of life — from distant parts of the country, from farm and factory, bank and bench — the rich and the poor, the illiterate and the educated — all are thrown together in a heterogeneous mixture and subjected to the same discipline, the same regulations and the same daily routine.

It is most astonishing how well and how rapidly they adapt themselves under these most difficult conditions. However, there is a small

number in whom this adjustment does not readily take place. It is among this class of men that one observes pathologic reactions, in the form of sluggishness, discontent, inadaptability, lonesomeness, nostalgia, lack of application, lack of initiative and ambition and, therefore, military inefficiency. Some of these, of course, are of markedly pathologic makeup, but the great majority are men to whom the neuropsychiatrist can be of the greatest assistance. These are the borderline cases; the potential neurotics and psychotics, in whom preventive psychiatry finds a most fertile field.

Many patients of this kind, although able to get along fairly well in camp, suffer a definite breakdown at some critical time, such as just before embarkation; others are returned from overseas before they have seen any active service at the front. In General Hospital No. 1 we have had the opportunity of observing a number of such cases.

SUGGESTIONS AS TO PROPER SUPERVISION

What can the neuropsychiatrist do for cases of this type? It is surprising how much the advice, encouragement, assurances, personal contact and attention and trivial changes in environment will do for these men. That this is not mere theory, but intensely practical, can readily be demonstrated in a military camp or cantonment. I will give a few brief illustrations:

The attention of the neuropsychiatrist is called to a soldier who is indifferent, inefficient, lazy and seemingly lacking in initiative. Examination reveals that he comes from a large city, has had a high-school education, worked as a salesman and had a salary of from $75 to $100 a week. He is made assistant in the camp to a kitchen worker, who is illiterate, far below him socially and whose earning capacity has never been more than $12 a week. The soldier does not complain of this, nor can he give any conscious reason for the change in his efficiency and conduct, which, however, he acknowledges. His commanding officer is advised to place him in another department, where his talents will find a better expression. Within a week, a striking change comes over his disposition and he is regarded as a most useful, energetic worker and a promising soldier.

A soldier serving as a waiter at an officers' mess, shows mild mental depression. He is regarded as slow, inattentive and inefficient. He complains of insomnia, nervousness, headache, dizziness and inability to take any interest in things. He is unable to assign any cause for his disability. He is anxious to be a soldier and serve his country. It is further found that he is a recent graduate of a New England college; has been brought up in affluence and comfort, and is socially equal or superior to many whom he attends as a waiter. He consciously

does not resent his position, because he feels that it is a part of military life. The commanding officer, on recommendation, assigns him to another kind of work, more in keeping with his talents and experience. He soon becomes active, energetic and efficient. He is regarded as good material for a soldier and is rapidly promoted. These are actual cases, selected from a large number, of which I have a record.

RESULTS THAT MAY BE EXPECTED

There are many soldiers who voluntarily seek the advice of the neuropsychiatrist, because of nervousness, dizziness, inability to sleep, poor appetite, indefinite pains, etc., and who, with marvelous rapidity, yield to treatment by the "nerve specialist" of the camp. The amount of effective effort which can be achieved in applied neuropsychiatry in the Army, is only limited by the experience, interest and ability of the neuropsychiatrist.

Work of this kind in a camp is extremely fascinating and stimulating. The neuropsychiatrist is no longer one who merely selects obvious cases of nervous and mental disease for elimination from the Army, but also one who heals, repairs, conserves and reconstructs. He becomes the guardian of the mental health, just as the sanitary surgeon is responsible for the physical welfare of the military organization.

If work of this kind is profitable in a camp or cantonment, how much more essential must it be at the front, where nervous tension, hardship and trying conditions of all kinds tax to the uttermost the endurance of the soldier. I think I am not speculating when I say that efforts along this line would be one of the most effective measures in lessening the incidences of nervous breakdown or so-called "shell shock."

It was in part, I believe, with this view, that the position of division neuropsychiatrist was created — one of the most important and far reaching achievements of the neuropsychiatric department of the Army, for which Colonel Bailey must be given the full credit.

It must be evident that work of this kind is extremely difficult, and that it is hardly a job for a novice or a young physician, however excellent his technical training may have been. It requires men of mature years, ripe judgment, with personal prestige, which can only come from many years of accumulated practical experience. This is one of the reasons why it is hoped that the leaders in neurology and psychiatry may be induced to enter the service.

THE GENERA IN CERTAIN GREAT GROUPS OR ORDERS OF MENTAL DISEASE*

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I want to present to the American Neurological Association certain amplifications of material presented in 1917 as a key to the practical grouping of mental diseases. Under the eleven groups of mental diseases defined in 1917, I wish to place such practical subdivisions as seem to me confirmed by American psychiatric experience.

As I find that many persons hardly distinguish between a classification and a key and labor under the impression that I am trying to erect a novel classification of mental diseases, let me insist that I am proposing nothing but a key to the classification of mental diseases according to the entities which I find in common diagnostic usage. I am elsewhere insisting on the extraordinary unanimity which American psychiatrists are now displaying on the matter of psychotic entities. There is, in fact, hardly enough controversy to indicate a healthy progress in the matter of theoretical psychiatry. (There is, to be sure, one large controversy concerning the nature and dimensions of psychogenesis and the part it may play in sundry mental diseases; but this controversy has to do with more general aspects of psychiatry than the question of its contained psychotic entities. Nothing is more hopeless than a discussion, for example, of psychogenesis in dementia praecox when the controversialists do not agree as to the clinical symptomatology of the cases under discussion.) This unanimity of view as to the psychotic entities of modern psychiatric science is so marked that a committee of the American Medico-Psychological Association has been able to formulate an acceptable list of such entities now in process of adoption by most of the institutions for the insane in the country. The progress in mental hygiene secured by this universal adoption of a list of psychotic entities is certainly a subject for congratulation.

PURPOSES OF THE AUTHOR'S INVESTIGATIONS

What I have been attempting of recent years on the basis of the diagnostic sifting-machine material afforded by the Psychopathic Hospital is to study the logical processes of psychiatric diagnosis and to

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find, if possible, some simpler ways in which to arrive logically at one or other of the psychotic entities which we virtually all agree on.

I have placed some larger considerations on this matter of the "process-types" of diagnosis in a paper read this year before the Association of American Physicians, to be published in the *Journal of Clinical and Laboratory Medicine*. The paper is entitled *"Diagnosis per Exclusionem in Ordine:* General and Psychiatric Remarks." I do not need to rehearse the points of this paper before the American Neurological Association. I was, in fact, trying to read something of a lesson to the diagnosticians of the eminent internist group represented by the Association of American Physicians, calling to their attention the need for more elaborate logical methods of approach to diagnosis in psychiatry than in many branches of medicine. Some of the elders amongst the internists had for years denounced the method of diagnosis by exclusion; one of them said that the method was bound to fail because of our ignorance of pathology and went on to say that diagnosis by exclusion was a tedious method. Of course, tediousness ought not to stand in the way of accuracy, and pathology is bound to remain imperfect for many decades, not to say centuries. The fact is that in fields of diagnosis where there are no indicator symptoms, the method of diagnosis by exclusion is unconditionally necessary; for, in the absence of an index of differentiation or indicator symptom (or "presenting symptom" as Dr. Richard Cabot sometimes calls it), the diagnostician is bound to take into account all forms of mental diseases when he is trying to eliminate and differentiate the particular psychosis displayed by his patient.

Hence, I went into some detail in the paper mentioned, on a method of diagnosis which I called *diagnosis per exclusionem in ordine*. The central part of the idea had already been presented in the paper entitled "A Key to the Practical Grouping of Mental Diseases," presented before you in 1917.

The advance which I want to make this year is implicit in the method of the key presented last year. Last year I suggested that the tyro in diagnosis might well consider and exclude in sequence the great groups of mental diseases A, B, C, D, etc. I put A before B, B before C, etc., simply because the methods of diagnosis in Group A appealed to me as more certain, practical and general in their scope than the method available for Group B; the same for the methods of Group B as against those for Group C, etc.

This year I want to set down the subgroups of mental diseases which it seems to me practically all of us admit exist (if we admit that any entities whatever exist), in a proper diagnostic order. I want

to extend the principle of orderly diagnosis, that is, of *diagnosis per exclusionem in ordine* (genera) under groups (orders, in the botanical or zoological sense). Now I must acknowledge at the outset that the farther we go into detail, the less unanimity must a priori be expected in the psychiatric world. Accordingly, I would concede that my proposals are bound to be far less acceptable in their details than the proposals in the more general key to the main orders of mental diseases presented in 1917, but if the principle of exclusion in order be accepted for practical diagnosis, then I shall have no quarrel with those who feel that the entities are too many, too few or even non-existent.

IMPORTANCE OF GROUPING DISEASES

One more general remark: I feel that the history of modern developments in logic indicates that the part of order is the one part which has undergone great developments in recent years. We have discovered that though we cannot always measure things, we can sometimes put them in order unmeasured. It seems to me that the development of orderly diagnosis is quite on the carpet for modern workers. It may not be superficial to say that expert diagnosticians may not need to employ the method of diagnosis by exclusion in order simply because the facts in a given case may immediately suggest to them (by processes of mere inspection or of very rapid comparison) the right diagnosis. Time and again, however, the best experts fail in their attempt to apply the methods of diagnosis by inspection and by comparison, and surely the inexpert youthful psychiatrist needs some key to guide him. How frequently in the clinic do we find that the youthful diagnostician is by very little emphasis here and there able to press the phenomena of his case either into the dementia praecox or the manic depressive group or into the senile or the focal brain disease group, respectively. The point of this difficulty lodges in the fact that there are practically no indicator symptoms in mental diseases, and actually any symptom you may specify is quite able to lead you in any one of the main diagnostic directions. Let a young diagnostician of the dogmatic or slightly paranoid type get the initial idea that a case belongs in the dementia praecox group, he will be able to defend his thesis against all comers by the use of symptom lists founded on the very best textbooks; in fact, the better the textbook the easier for the young tyro to carry his point — for the time being.

Following are tabulated suggestions for the generic classification of mental disease groups, each group followed by some general remarks.

I. Syphilopsychoses* (the syphilitic mental diseases):

Genera:

General paresis	Less common genera:
Juvenile paresis	Syphilitic feeblemindedness
Nonparetic forms:	Syphilitic epilepsy
Meningitis	Tabetic psychoses
Vascular	Syphilitic paranoia
Gummatous	

Of course, the syphilopsychoses are by no means coterminous with neurosyphilis. The term neurosyphilis generally taken, must be supposed to include both the syphilopsychoses and the syphiloneuroses. The systematist will find a certain difficulty in placing many forms of neurosyphilis amongst the psychoses and the neuroses, respectively. We are here dealing with the psychoses, and our classification does not include the neuroses.

If one were asked how to distinguish the syphilopsychoses from the syphiloneuroses, one would have to reply on practical grounds that, if the case showed psychotic symptoms, it should be placed among the psychoses even if there were also present, is is usually the case, a number of neurotic symptoms. In short, owing to their practical significance, psychoses might be supposed to have the first call in classification as against neuroses. On this account the disease commonly known as general paresis would fall amongst the syphilopsychoses, despite the existence therein of any number of symptoms pointing to nonpsychical part of the nervous system. On the other hand, the disease commonly known as tabes dorsalis would best be placed amongst the organic neuroses, despite the appearance in tabes from time to time of a few mental symptoms. If, however, a case of tabes develops symptoms of a paretic nature, then the common rule is to term the case one of taboparesis. If in the course of the tabes certain characteristic excitements with hallucinations appear, then we have a rare entity known as tabetic psychosis. I am not sure that there has even been a well established case of this disease, tabetic psychosis, in the Psychopathic Hospital clinics amongst 10,000 admissions. So much for the general relation of the syphilopsychoses to the syphiloneuroses.

The issue is a practical one, and decision is made on the appearance of psychotic symptoms in the case. If these dominate the scene, then

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* Re-syphilopsychoses: Dr. Solomon and I in a recent case-book tried to bring order into the nomenclature of neurosyphilis by reducing the main forms thereof to:

(*a*) Paretic	(*d*) Vascular
(*b*) Tabetic	(*e*) Gummatous
(*c*) Diffuse	(*f*) Juvenile

the case should in my opinion be termed syphilopsychotic. Of course, if the syphilitic infection precedes and in a psychogenic way occasions a neurasthenia, then from this point of view we should not be dealing with a case of syphilopsychosis, but with a case of psychoneurosis. If, as in one of the war cases, a syphilitic infection appears to bring about an epilepsy, we are not dealing according to this grouping with an epilepsy which is syphilitic, but an epilepsy presumably brought about in some psychogenic way and only indirectly due to the operations of spirochetes. These two exceptional diseases might be then named psychoneurosis syphilogenica and epilepsia syphilogenica, in which we place in the adjective the exciting factor and place in the abstract noun the general nature of the disease in question.

Syphilopsychoses, then, are diseases in which the psychosis is essentially spirochetal. Where the spirochete acts after the fashion of an occasioning factor, it would seem wiser in the interests of the patient to place the disease elsewhere.

A note on the order in which the genera under the syphilopsychoses have been placed is in point. I have placed, in the foregoing grouping, general paresis first because it seems to me that the means for its diagnosis are more exact and reliable than the means for the diagnosis of the other forms of syphilopsychosis.

I have placed juvenile paresis second, hoping that the systematic examiner of cases of this group will consider very early in his logical work the question of congenital neurosyphilis. It has seemed to us at the Psychopathic Hospital that a good many errors in diagnosis have been made by the lack of consideration of congenital factors. These errors do not stand out so strongly in district state hospital material as in Psychopathic Hospital material.

The third genus or group of genera under the syphilopsychoses is constituted by the nonparetic forms. Despite the difficulty of the mutual differentiation of this group, I am inclined to separate the genera as indicated into meningitic, vascular and gummatous. To define a genus through negative features is a device which should not be resorted to except in extremity. Accordingly, I hold that the diagnosis cerebral syphilis, cerebrospinal syphilis, as made in many of our clinics, is as a rule no more exact than the more general diagnosis neurosyphilis. When this diagnosis is rendered, there are often no prognostic data available. As a matter of fact, as pointed out by Solomon and myself in the book previously mentioned, much damage may be done to a patient by terming him either general paresis or cerebrospinal syphilis at a time when it is strictly impossible to tell to which genus of the order syphilopsychoses the patient really belongs. At a little later stage in diagnosis, when more data have been collected, it is

virtually always possible, especially with the laboratory data now available, to indicate whether one regards a case as meningitic, vascular or gummatous. Why then, should we stop with the diagnosis "cerebrospinal syphilis," which amounts to little more than the statement that a man has either syphilopsychosis or syphiloneurosis, when we can profitably permit ourselves a generic diagnosis which may indeed practically help the patient a good deal.

Accordingly, I hold that general paresis, juvenile paresis, meningitic, vascular and gummatous syphilopsychoses form fairly well recognized genera in the order of syphilopsychoses. I do not propose a nomenclature, however, for these genera, hoping to excite a critique on the matter.

In addition to these five more or less readily distinguished genera under the order syphilopsychoses, there are a number of less common ones.

Shall we term syphilitic feeblemindedness a form of feeblemindedness or shall we term it a form of syphilopsychosis? According to the general principles of diagnosis by exclusion in order and in the pragmatic and therapeutic interest of the patient, I very much prefer to have the disease classified under the syphilopsychoses. Order Number ii, that of the hypophrenias, is made to include practically all kinds of feeblemindedness which have been defined. Why then should we not speak of a hypophrenia syphilitica? Would it not help the specialists in feeblemindedness so to classify their material? From that more limited standpoint I should agree that hypophrenia syphilitica might be a proper term for the somewhat rare disease, but from the standpoint of neurologic clinics, neurologic and psychiatric clinics, district state hospitals, psychopathic hospitals, I would still think it best to insist on the pragmatic side of the situation by regarding this disease as one amongst the syphilopsychoses. It might be termed neurosyphilis hypophrenica.

Identical considerations hold for syphilitic epilepsy; in fact, it seems to me that the considerations are here stronger; for it is certainly much more definite to term a condition neurosyphilis epileptica than it is to call it epilepsia syphilitica. From the more limited standpoint of the epileptologist, of course epilepsia syphilitica may approve itself, but epilepsy is so much broader and vaguer a concept that it seems to me highly worth while to place all cases of epilepsy regarded as syphilitic in origin amongst the cases of neurosyphilis.

I called attention in the foregoing to one of the war cases in which the acquisition of a syphilitic infection brought out an epilepsy: that case presumably belonged neither in the syphilopsychoses nor in the epileptoses, but rather amongst the psychogenic cases which we rele-

gate to a much lower place on the scale. Such a case might very possibly be classed in the genus hysteria, of the order psychoneuroses. If we hold the diagnostician down in such a case to an exact definition of what he means by making him specify the genus or order in question, we shall greatly improve our logical technic in diagnosis. For instance, is the case one of syphilopsychosis epileptica? Then we would suppose that the spirochetes were in some way acting on the brain so that a true epilepsy hardly distinguishable from sundry other organic forms was being produced. Or, is the case one of hysteria epileptica or hysteria epileptoides in which the adjective conforms with the degree of doubt concerning the observed phenomena themselves? Under the latter circumstance a quite different genesis is to be suspected at work. But, you will reply, how often are we unable to tell which form of genesis is in play? Quite right, one must reply, but until one knows what form of genesis is in play, the true or indicative diagnosis, the really pragmatic diagnosis which will help treatment, has not been rendered.

It seems to me that the diagnostic sheets and statistical tables of many clinics are full of these hedging diagnoses.

As for other less common genera, tabetic psychosis and syphilitic paranoia, something has been said in the foregoing concerning tabetic psychosis (note again that we do *not* mean by tabetic psychosis that subform of general paresis called tabo-paresis); and I shall not delay on syphilitic paranoia, an exceedingly rare genus if it at all occurs.

Under the term atypical, as under other orders of mental disease, I propose to leave room for syphilitic mental diseases of doubtful or hitherto undefined nature, for it is no part of the present endeavor to enumerate and fixate a nomenclature for the psychoses. As in several places stated, I am simply trying to take the groups which modern clinics recognize and place them in a practical diagnostic sequence.

II. Hypophrenoses (the feeblemindednesses, including graded forms of idiocy, imbecility, moronity (in the English nomenclature feeblemindedness proper) and subnormals):

[Syphilitic]

Encephalopathic:
Microcephaly, hydrocephalus, focal brain.

Glandular:
Cretinism, infantilism, dysadenoidism, mongolism (?).

Hereditary:
Feeblemindedness, amaurotic family idiocy.

Atypical.

I have placed the syphilitic group, which might possibly be regarded a good genus, under the hypophrenias in brackets. These brackets here and elsewhere are intended to indicate that the genus has been suffi-

ciently covered in the higher group to which the orderly diagnostician will have already had access.

Refer to what has preceded for notes on whether we should prefer neurosyphilis hydrophrenica to hypophrenia syphilitica. The decision is a close one. I regard it as in the practical interest of the patient to have him classified under the syphilopsychoses. One example of this sort in which an ordinary form of feeblemindedness was found due to syphilis has been given in the Southard-Solomon collection previously mentioned; also in the Waverley Series on the Pathology of the Feebleminded there are data which indicate that we must take into account more than in the past the question of the relation of syphilis to feeblemindedness.

As for the nomenclature of hypophrenia, I have drawn up the arguments for the use of the term hypophrenia as against several others in the literature in a special paper which I hope will be shortly published, entitled, "Hypophrenia and Hypophrenics: Suggestions in the Nomenclature of the Feeblemindednesses." (*Mental Hygiene*, in press.)

Passing to the genera themselves, I am inclined to think that the encephalopathic, the glandular and hereditary groups ought to be regarded as suborders or collections of genera rather than as genera themselves. I do not here propose to suggest a nomenclature for the genera themselves, but have picked out microcephaly, hydrocephalus, other forms of focal brain disorder, cretinism, infantilism, dysadenoidism, mongolism, amaurotic family idiocy and the common form of hereditary feeblemindedness as suitable genera in the present phase of development of the theory of the feeblemindednesses.

With some doubt I place mongolism under the glandular diseases because many workers whom I have met feel that this disease will prove to belong there.

As for the common hereditary form of feeblemindedness, which might be named hypophrenia hereditaria, I feel that it will bulk much smaller than specialists have recently given us reason for supposing. If the encephalopathic cases are pulled to one side (regardless of their possessing tainted heredity, since it is obvious that other factors than mere hereditary germ plasm factors must have been at work), and if many of the glandular cases are set to one side as being directly due to sundry nonhereditary factors, the number of cases which we should be entitled to call hypophrenia hereditaria will be greatly diminished. A number of theoretically preventable cases of feeblemindedness and a number of cases due to brain-destroying and body-destroying factors of a nongerm-plasm nature have been defined in recent work. Of course, the anatomists and pathologists will give

statistics that are possibly unfair to the hypothesis of germ-plasm heredity, since the anatomists and pathologists may overvalue sundry of their brain and body findings; but with all due allowance for this anatomic prejudice, certainly the number of cases of hereditary feeblemindedness in the sense in which we use the term hereditary in the rest of medicine, is year by year diminishing with the progress of medical science.

In my paper of last year entitled, "A Key to the Practical Grouping of Mental Diseases," I endeavored to divide the hypophrenias into genera according to the quantitative results of mental tests. I am inclined to think, however, that this suggestion, however compatible with the spirit of the times with respect to the increasing accuracy of mental tests, is unsuited to the practical work of a clinic. After all, the question whether a patient is a mongolian hypophrenic is more important than whether he is an imbecile or an idiot. The same holds true for hydrocephalus and in fact for a majority of the hypophrenics. The procedure would be to determine your genus and estimate the amount of intelligence shown by the particular example in hand.

As under Group I, I have made provision by the term atypical for genera of an unknown or undescribed nature.

III. Epileptoses (the epileptic group):

[Syphilitic, Group I]

[Feeblemindedness with epilepsy, Group II]

Alcoholic	Idiopathic
Traumatic	Equivalent
Encephalopathic	Narcoleptic
Jacksonian	Borderland
Symptomatic	

Concerning the bracketing of the syphilitic and feebleminded forms, refer to the remarks under Group II.

I will not here attempt to justify the selection of genera under the epileptoses. This is a veritable mare's nest in classification and the man who wishes to use a classification by putting the elements in order of consideration is greatly at a loss. Practically it has seemed to me that if one could push on one side early the alcohol and traumatic question that one would come down on the questions of brain tumor, etc., with a great deal more confidence than if one started in with the latter. Also, practically there are many questions concerning the proper classification of all sorts of diseases having convulsions. The pragmatic answer to the question whether a given disease should be classified under epileptoses or under some other group depends, it seems to me, on the kind of treatment which you propose on your basis of analysis to give the patient. If the kind of treatment is nothing but the regimen, custodial or otherwise, which you prefer for epileptics in general, then the case should be classified amongst the

epileptics. If, however, the convulsions are incidental in some bodily disease, or even in some brain disease in which special surgical treatment or other special treatment may be indicated, then it seems to me that we do the patient a pragmatic injury by classifying him among the epileptics and not in some more definite group of diseases. On this line refer to the remarks concerning epilepsy in syphilis under Group I.

The thumb rule would be: Never classify a case as epileptic if you can be more definite as to its nature and especially its cause.

IV. PHARMACOPSYCHOSES (the group of mental diseases due to alcohol, drugs and poisons):

[Epileptic, Group III]

Alcoholic

A. Pseudonormal:
Drunkenness, pathologic intoxication, dipsomania

B. Peripheral-Central:
Delirium tremens, hallucinosis, Korsakow, pseudoparesis.

C. Central:
Jealousy-psychosis, paranoia (?), dementia

Drug:
Morphin, cocain, alkaloid

Poison:
Lead, gas, mercurichlorid, special

I will not pause to discuss the details under Group IV. It would seem to me that the designation pharmacopsychoses is a good one, as the Greek word on which the term is founded can be used for both drugs and poisons.

A great deal of theoretical interest attaches to the nature as well as to the diagnosis of the subforms of alcoholic psychoses. I have cast these into three groups, rather inadequately termed pseudonormal, peripheral-central and central. My point is that ordinary drunkenness and so-called pathologic intoxication and dipsomania form three conditions which are, if not normal, then distinctly less abnormal than the other diseases. Drunkenness, it may be stated, is not a form of insanity, and many legislators have so determined, but that drunkenness is not a kind of psychosis I think hardly any one would deny. Here is an instance in which the distinction between a mental disease and insanity comes out very clearly.

But is it possible to distinguish the peripheral-central group from a central one? Practical workers, it seems to me, would agree that delirium tremens, alcoholic hallucinosis, Korsakow's disease and the so-called alcoholic pseudoparesis (if this latter disease at all exists) more closely resemble one another than they do in any of the other forms of alcoholic mental disease. If some one could provide a good designation for this small fraternity of alcoholic disease genera which I have called peripheral-central, he would help our practical work a

good deal. I find a good deal of almost useless discussion in early phases of observation of alcoholic cases as to whether they are instances of delirium tremens or alcoholic hallucinosis. I do not wish to deny a generic value to the distinction, but if we could halt our diagnostic process at the point where the observations stop, we should help psychiatric diagnosis not a little.

The third group that I have termed "central" is composed of the jealousy psychoses which most workers acknowledge that they find in certain instances, paranoia (a much more doubtful matter) and dementia. Here are diseases in which the peripheral element, histologically and symptomatically, is far less in evidence. To be sure there may have been some element of a peripheral nature in the disease at some time, but the chances are that such cases with strong peripheral element belong in the peripheral-central group rather than in the central group. An exact and elegant nomenclature would be a bonanza for practical workers among the pharmacopsychoses.

V. ENCEPHALOPSYCHOSES (focal brain lesion group of mental diseases):

[Syphilis]*
[Feeblemindedness]*
[Epilepsy]*
[Alcohol, gas]*

Traumatic. Note that the traumatic neuroses, although they form a group of mental diseases, belong not here in Group V, but below in Group X, the psychoneuroses.

Neoplastic.

Infectious. The infectious group of encephalopsychoses here listed refers to cases like brain abscess and meningitis in which the organism has produced local destructive effects in the brain.

Vascular. Under this group would fall the great group of arteriosclerotic dementias which, be it noted, are parted out from the old age psychoses; Group VIII, below.

Degenerative.

VI. SOMATOPSYCHOSES† (the so-called symptomatic group of mental diseases):

[Glandular feeblemindedness]
[Symptomatic epilepsy]
Infectious, e. g., typhoid
Exhaustive, e. g., puerperal
Metabolic, e. g., cardiorenal
Glandular, e. g., thyrotoxic
Pellagrous

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*These have been classified, respectively, under syphilopsychoses, Group I; hypophrenoses, Group II; epileptoses, Group III, and pharmacopsychoses, Group IV.

†The term "somatic" is here used following a frequent neurologic plan which employs the term "soma" for the body at large, as against the "encephalon" or brain.

I have tried to define the genera under the five subgroups here mentioned, though I assume that the progress of science will show that a symptomatic psychosis due to the typhoid bacillus is to be distinguished from a symptomatic psychosis due to the pneumococcus; but these are matters for the future to decide.

In practice one should not term a case infectious psychosis, in my opinion, unless an organism has been cultivated from the case or unless there is exceedingly strong evidence that an infection is in play. A good many puerperal cases, when organisms are cultivated therefrom, become on this basis infectious cases rather than exhaustive cases; but who would say that such a translation from one group to another would not be of benefit to the case.

Many authors speak of a toxic-infectious group, of an infectious-exhaustive group or even of a toxic-infectious-exhaustive group, but it seems to me with these double and triple designations we get on not much better than if we confine our statements to saying that the case belongs among the symptomatic psychoses. In short, we are making a very rough diagnosis and placing a case in a large group, but we are rather deluding ourselves that we are making entitative diagnosis.

When infection is not in play and when exhaustion is not in play, I can hardly see the advantage of using the term toxic. The term toxic suggests to the medical hearer that there may well be a toxin in play, that is, such a substance as may be demonstrated in the test tube or under other strictly scientific rules. If pinned down to the meaning of the term, the physician is apt to be reduced to saying that the term toxic refers to certain clinical symptoms that resemble those that are the known effects of toxins or poisons, infectious or otherwise. But is not this a retreat to ground altogether too general to be of value in diagnosis? Perhaps others will not agree with me; but when I see the term toxic and feel that there is no possible laboratory approach to the toxin-poison question, I fall into a marsh of doubt.

The third group of genera here termed metabolic is also sometimes laden with the term toxic, in fact, possibly the term autotoxic might be preferred by many to the term metabolic here used. I can see that the term metabolic is too general a term, but, on the other hand, the term autotoxic seems to specify too much.

The point in the ordering of these subgroups is that, in practical diagnosis, one ought to exclude in succession conditions in which there is a known infectious agent, conditions in which an exhaustive state without known infection, conditions of a general metabolic or autotoxic nature. Those ought to be eliminated from the scene before the glandular cases are brought under consideration.

Possibly the pellagrous group might be placed first under the symptomatic group. Indeed, in regions where pellagra is infrequent,

now and then grave errors of diagnosis have been made. I well remember that one of the first cases of pellagra which came to the Psychopathic Hospital was one of an obscure kind of depression with apparently a cyanosis of the hands regarded as a very proper vasomotor by-effect in his psychosis. By the systematic sequential consideration of these conditions, including pellagra, the question was definitely raised concerning this man whether he might not be pellagrous. The psychosis was then more carefully examined and sundry other features were brought into alignment with the manual lesions. A tentative diagnosis of pellagra was made and the patient thereafter developed a classic form of the disease.

VII. GERIOPSYCHOSES* (the presenile-senile group of mental diseases):

[Epilepsy]
[Vascular]
[Alzheimer's]
[Progeria]
[Late catatonia]
[Involution melancholia]
Presenile psychoses
Senile dementia
Presbyophrenia
Senile psychoses

One of the peculiar advantages of this pragmatic sequence of consideration is that the senile dements are removed so far from the arteriosclerotic cases. (Refer to note under Group V.) Kraepelin rightly terms the presenile division of psychiatric cases the darkest field in psychiatry. I am aware how many subgroups Kraepelin has proposed among the preseniles, but for the moment am unable to define what types should be given under the heading presenile psychoses.

VIII. SCHIZOPHRENOSES (the dementia praecox group):

Hebephrenia	Schizophasia
Catatonia	D. praecoccissima
Paranoid	D. simplex
Cyclothymoid †	Paraphrenia

* This term is adopted provisionally as against the possible term presbyopsychoses, because of Nascher's choice of the term "geriatrics" for his proposed branch of medicine, dealing with the diseases of old age.

† This genus, if it be such, is devised to include the practically very important group of cases in which the schizophrenic process is precipitated by phenomena that resemble manic depressive psychosis, or in which there is a definitely cyclothymic course in itself suggesting the true cyclothymoses.

As for Group VIII, no discussion need be given concerning hebephrenia, catatonia and paranoid. To be sure, concerning the latter Kraepelin has endeavored to distinguish two forms, mitis and gravis, but whether this is a pragmatic distinction of great importance to the future of the patient is doubtful.

As for the term cyclothymoid, I feel that this concept is of some value. First, concerning the term cyclothymoid. The name of this genus, if it be such, would be "schizophrenia cyclothymoides." The ending *oides* used in the specific adjective would be in general borrowed, as in this instance, from some other genus or group. By "schizophrenia cyclothymoides" we would then mean a dementia praecox that somehow very closely resembled a manic-depressive psychosis, that is, a schizophrenia that somehow closely resembled a cyclothymia. If now there were a true cyclothymia (that is, manic depressive) that closely resembled a schizophrenia, we should be forced to dub it "cyclothymia schizophrenoides," borrowing for our specific adjective from another genus and adding the ending *oides*. This procedure would be roughly in accordance with botanical procedure. It would be purely a question of fact whether there is such a condition as "cyclothymia schizophrenoides."

As for the existence of cyclothymoid types of schizophrenia, there can hardly be any doubt that these forms exist. When Kraepelin expanded his original three forms of dementia praecox to nine, he found himself with three new subforms that I have here lumped together under the heading "schizophrenia cyclothymoides." There can be no practical doubt of their existence.

As for the other subheads under the schizophrenias, schizophasia is a small group of Kraepelin's own, of which we now and then see examples. I have added dementia praecocissima group of de Sanctis not because its existence is necessarily well established, but because there seemed to be cases which might well belong in the group if they could be held under observation for some decades longer and their course made out.

It is a question whether dementia simplex should form a genus alongside hebephrenia and whether dementia simplex is more than a mild form of hebephrenia. The term is useful for those cases of slight deterioration which we see in subjects that remain sufficiently well to be self-supporting and only slightly eccentric or dull.

The genus paraphrenia is as Kraepelin has proposed, practically Magnan's disease, that is the *délire chronique à evolution systematisée*. Kraepelin gives four subclasses of this disease which may possibly be species or varieties, namely, paraphrenia systematica, confabulans, phantastica, expansiva.

IX. CYCLOTHYMOSES (the manic-depressive and cyclothymic group of mental diseases):

Cyclothymic constitution	Mania
Manic-depressive	Mixed
Melancholia	Involution-melancholia

As to the distinction between manic-depressive and the mixed forms of cyclothymia, I would suppose it wise to call manic-depressive cases (in this generic sense) those in which both mania and depression in different phases of the patient's course are developed.

It would be wise in my opinion to replace the term manic-depressive as a group designation with the term cyclothymia, which brings out the affective features and the phasic features of the disease. If a case is cyclothymic, we shall be able to arrive at the diagnosis having excluded all its competitors for preference down through the schizophrenias.

Now let us say that we are confronted by a case of pure mania or pure depression which we know is not syphilitic, or alcoholic, or symptomatic of some somatic condition, or schizophrenic. We shall be entitled to term it cyclothymic with a high degree of probability, unless perchance on further investigation we determine it to be a psychoneurotic phenomenon. But, again, can we say that this phase of mania or depression is going to be followed by its opposite, depression or mania? It seems to me that we decidedly cannot. The prognosis would better be confined to saying that emotional disorder is likely again to occur. Is not this approximately the extent to which one can now go in making a prognosis in cyclothymic cases? The future may do more for us than has the past. Wernicke remarks that no case of chronic mania was ever initiated by an acute mania. A number of important and easily manageable statistical researches could be made on this line; but psychiatrists are not particularly interested in such statistical researches, however valuable in prognosis their results might be, because they seem to be under the spell of the idea "manic-depressive." According to my conception, the idea of manic-depressive is the idea of a large group of diseases. It is questionable whether Kraepelin discovered a new disease. He defined a great group of diseases, each of which had already been defined, as having certain affinities with one another.

As for the term mixed, I wish by this term to signify cases in which depressive and maniacal phenomena are commingled within a single phase of the disease.

As for involution-melancholia and its placing among the cyclothymias, I do not wish to take a definite stand. Very possibly this disease would better be placed amongst the old age phenomena, as the term involution would suggest.

X. PSYCHONEUROSES:

Hysteria
Neurasthenia
Psychasthenia

This is not the place to discuss the genera and species and varieties of the psychoneuroses. Walton some years since insisted on the value of not making generic diagnoses of neurasthenia, psychasthenia or hysteria. He would have the diagnostician confine himself to terming the case psychoneurosis.

Regarding hysteria, I am inclined to think that in many early phases of these psychoneuroses, Walton's plan is beneficial. It is a question how far a diagnostician wishes to go. Some physicians are perfectly content to call a case mental, that is to say, under the *morbi mentales*, and let it go at that. Others will be content to place a case, for example, under the psychoneuroses and then call in some person especially qualified to cure the case; for the psychoneuroses form essentially the psychotherapeutic group. The specialist may wish to go farther and identify the genus or species, or even the varieties of the large group. No doubt the progress of science depends on further developments in these directions, provided that these developments be pragmatic ones in the interest of helping the patient.

XI. PSYCHOPATHOSES (the psychopathic group of mental diseases):

Prison psychoses	Sense deprivation psychosis
Folie à Deux	Monomania
Litigation psychosis	Psychopathia sexualis
Paranoia	Psychopathic personality

Concerning the last or eleventh group, there might be much to say. Let me say here that I would speak of this group in common parlance as the psychopathias, not using the ordinal term psychopathoses except in contradistinction to other ordinal groups. The existence of these scientific terms having relatively exact distinction should not preclude our every-day use in the clinic of commoner terms. Just as one would not order *Rosaceae* at the florist's or *Leguminosae* at the grocer's, so one would not use these scientific terms except when one was in doubt exactly where a case ought to belong. In the progress of psychiatric science, the genera under this eleventh group ought to become more and more definite. Some of the genera will doubtless be relegated to pre-existent groups; others may form new orders suitable to elevation to the rank of groups like the psychoneuroses, the syphilopsychoses, etc. I have given in the preceding a small collection of these doubtful psychopathias. None of these require special mention here, perhaps.

Paranoia, I place among the doubtful psychopathias because I do not see that it has been proved to have a schizophrenic nature, and feel that it cannot otherwise be placed in the previous groups. The suggestion that it is a sort of intellectual infantilism is an attractive one, but it seems a little far fetched to place our apparently complex paranoias amongst the feebleminded.

Some persons might object to the use of the term monomania, but if we do not use this term we should need to enumerate such genera as kleptomania, pyromania and poriomania (*Wanderlust*). The polemic in which the term monomania was overthrown is long since reduced to ashes. The term it seems to me remains a good one for precisely those nonsexual cases with unusual development of particular instincts.

As for the term psychopathic personality, it is surely a bone of contention; but if we exclude the sexual cases under the term psychopathia sexualis and exclude the cases with special instincts in strong relief (the monomanias), we shall then have on our hands certain cases of psychopathic personality that are apparently worthy of a place. Many of the so-called defective delinquents very probably fall in this group, though an endeavor should constantly be made to place them amongst the hypophrenics, the epileptics, the schizophrenics, the psychopathic monomanias, etc. All psychiatrists agree that we should not prejudge the situation in criminology by terming all defective delinquents forthwith psychopathic personalities. Let us leave room for the existence of criminals that are not psychopathic.

One might inquire whether there are not certain psychogenic cases that might belong in this eleventh group, that is, cases which cannot be regarded as hysteric, neurasthenic or psychasthenic. Doubtless the neuropsychiatry of the war will help to resolve that question.

SUMMARY

In this paper I have tried to amplify the key to the practical grouping of mental diseases presented to the American Neurological Association in 1917. I have amplified it by proposing certain genera comprised under each of the eleven major groups of mental diseases. These genera have been placed in the sequence supposed to be the pragmatic sequence in which the inexpert diagnostician should seek to exclude successively the various genera; in short, just as the key to the practical grouping of mental diseases dealt in a certain sequence with eleven major groups, so here the diagnostician is given an idea as to the proper method of considering one after another the genera comprised in each great group. No endeavor has been made to revamp or especially modify the ideas of psychiatrists as to what psychotic entities exist. Finality cannot be hoped for either theoreti-

cally or practically. The principle of diagnosis *per exclusionem in ordine* is the special principle insisted on. *It is applicable to any diagnostic problem after the data of observation are collected.* True diagnosis can only take place after sufficient data are collected, and efforts to make diagnoses early in the stage of collecting data are apt to result in prejudice.

The writer earnestly hopes for critique of his propositions. Such critique he hopes will be separated into:

(*a*) Critique of the general principle of *diagnosis per exclusionem in ordine.*

(*b*) Critique of the genera chosen for the different groups.

(*c*) Critique of nomenclature.

But judging from the world's experience in the past, it is unlikely that many persons will be able to distinguish nomenclature from the objects named and the method of using a classification from the classification itself. Herein some nomenclatural suggestions are made; but they have nothing to do with the main line of argument. Herein a certain classification is adopted, but there is absolutely no pretence to originality therein. The writer's main emphasis is on the pragmatic principle of diagnosis, namely, the principle of diagnosis by exclusion in order which principle will prove useful or useless without regard to the classification which it endeavors to exploit or the nomenclature which it uses by the way.

Editorial Announcement

About 100 leading neurologists and psychiatrists formally requested the Board of Trustees of the American Medical Association to undertake the publication of a new journal devoted to nervous and mental diseases. After due consideration the trustees granted the request, and this first number of the ARCHIVES OF NEUROLOGY AND PSYCHIATRY is the result.

We must all recognize that during the last twenty-five years there have been great, at times startling, advances in neurology and psychiatry. It is not so well recognized that in the recent war the neurologist and psychiatrist at the front has probably been of more importance than the internist. And we believe that it will be generally admitted that the mass of the medical profession is not so well informed on nervous diseases and mental disorders as on most other branches of medical science.

The trustees agreed with the petitioners that there was need of a publication which would at once stimulate the efforts of the best neurologists and psychiatrists of the country and serve as adequate medium for reports of the fruit of their labors; which would keep its readers in touch with the best work in all countries, and which would help to elevate the general standard of knowledge of the nervous system and its diseases. Just at this time the need is greater than ever before. The war has been a great school, but many of the lessons taught need to be—must be—more generally known. The complexities of civil life are increasing, changes are rapid and more are impending. The enormous industrial development in the United States has involved and will involve injuries and disease of the nervous system, psychoneuroses and psychoses. All of these things demand research, report, education. In short, the need is for a scientific publication of high ideals which shall not only serve the purpose of the research man and technical expert, but which shall also be of immediate practical value to the clinician. This need the ARCHIVES OF NEUROLOGY AND PSYCHIATRY aspires to meet.

Owing to many difficulties and delays the editorial organization is not complete, and the board is keenly alive to the defects of this first number. The unexcelled facilities of the American Medical Association press will leave nothing to be desired in the way of illustrations: colored and black and white. It may be proper to add that the ARCHIVES is published for the benefit of the medical profession and in the interest of scientific medicine and not for monetary gain. It will be as ethical, as independent and as helpful as the editors can make it. In return they hope for the sympathy and support of their colleagues.

THE EDITORIAL BOARD.

Major Alfred Reginald Allen, U.S.A.

1876—1918

Obituary

MAJOR ALFRED REGINALD ALLEN, U.S.A.

1876—1918

CHARLES K. MILLS, M.D., LL.D.

Major Alfred Reginald Allen was born at East Greenwich, R. I., May 26, 1876, and died in France, September 30, 1918.

He came to his untimely but glorious end toward the close of the great war at the height of the fierce and prolonged engagement known variously as the Battle of the Meuse or of the Argonne. The battle was largely fought over the ground intervening between the Forest of the Argonne and the west side of the Meuse. On September 26, a commanding position known as Montfaucon was captured by the American forces. The fight continued until October 4. About 5:30 in the afternoon of September 29, Major Allen, while directing his battalion at the little village of Nantillois, a few miles from Montfaucon, received a fatal shrapnel wound in the head. He did not regain consciousness, and died at 4 o'clock on the morning of September 30. He was buried with military honors not far from the place of his death.

Major Allen was the lineal descendant of Samuel Allen, a Friend from Chew Magna, near Bristol, England, who arrived with his wife and family where Chester, Pa., now stands, on Dec. 11, 1681. Samuel Allen had a long line of descendants, some of them well known in the annals of Pennsylvania.

Through the marriage of Nicholas Waln's daughter, Jane, with Samuel Allen, Jr., son of the progenitor of the family in this country, Major Allen was also a descendant in the direct line from Waln who came in the ship "Welcome" with William Penn in 1682. Dr. Harrison Allen, the distinguished Philadelphia anatomist and surgeon, was a first cousin of Major Allen's father, the Rev. George Pomeroy Allen, D.D.

The American founder of the Pomeroy family, from whom Major Allen was descended through his paternal grandmother, was one Eltweed Pomeroy, born at Beaminster, County Dorset, England, in 1585. He landed in America with his family in 1630 at Matapan on Massachusetts Bay, where he and his companions laid out the town of Dorchester. This Eltweed Pomeroy, genealogical records show,

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Read at the meeting of the Philadelphia Neurological Society, Dec. 18, 1918.

had a highly distinguished ancestry, and some of his descendants were noted in American history. One of them, Gen. Seth Pomeroy, was an officer in the French and Indian War, fought in the ranks at the Battle of Bunker Hill, and later became a major-general in the Patriot Army.

The mother of Major Allen was Elizabeth, daughter of Mark Anthony DeWolf Howe, the first bishop of the central diocese of Pennsylvania. Mark Anthony DeWolf, the common ancestor of all the DeWolfs of Rhode Island, was born 1726 and died 1793. He was the great-great-grandson of Balthasar DeWolf, apparently the first of his line in this country, mentioned in the records of Hartford, Conn., in 1656. The DeWolfs were prominent in Rhode Island, one of them, James DeWolf, being a United States senator about 1820. The Howes were descended from James Howe, who came from England in 1637 to Roxbury, Mass.

It is rare that one can point to so long and honorable an American lineage as that of Major Allen, whose progenitors in all lines settled in this country more than two centuries ago.

Allen's preparatory education was at Selwin Hall, near Reading, Pa. He was a student at Lehigh University in 1893 and 1894, and graduated in medicine at the University of Pennsylvania in 1898. He married on Jan. 21, 1904, Helen, daughter of E. Burgess and Emma (Bolton) Warren. His wife survives him and he leaves two children, Alfred Reginald Allen, Jr., and Helen Warren Allen, twins, born March 22, 1905.

For several years after his graduation, Allen was associated as personal and hospital assistant with the late Dr. S. Weir Mitchell. He was held in high esteem by Dr. Mitchell, from whom he received his first impulse to the pursuit of neurology.

In 1905, Allen engaged in pathologic research in the laboratory of neuropathology of the University of Pennsylvania. In the following year he became formally connected with the neurological staff of the University Medical School. From 1907-1911 he was instructor in neurology and neuropathology; from 1907, assistant neurologist to the University Hospital; from 1908 until the time of his death, one of the chiefs of clinic of the neurological department, and from 1911, associate in neurology and neuropathology. For several years he was assistant neurologist to the Philadelphia General Hospital.

Allen was a fellow of the College of Physicians of Philadelphia; and was a member of the Philadelphia Neurological Society, of which he was secretary in 1908 and 1909, and president in 1910. He was a member of the American Neurological Association, of which he was secretary and treasurer, 1909-1917. He was one of the original

members of the American Psychopathological Association, of which he was president, 1914 and 1915. As secretary of the United States delegation, he attended the Sixteenth International Medical Congress at Budapest in 1909, and in the same capacity the Seventeenth International Medical Congress at London in 1913.

In the Philadelphia Postgraduate School of Neurology, Allen gave several courses of instruction on neurophysiology at his rooms in the medical laboratories of the University of Pennsylvania. This instruction, which was both didactic and demonstrative, was highly appreciated by the students in attendance.

The neurologic contributions of Allen were chiefly published within a period of ten years, from 1905 to 1914. While not numerous, they were valuable, and illustrated his ability as a clinician, his technical proficiency with the microscope, and the initiative of a mind always alert and progressive.

His first noteworthy neurologic paper, on "Combined Pseudosystemic Disease, with Special Reference to Annular Degeneration," was published in the *University of Pennsylvania Medical Bulletin,* January, 1905. This and nearly all his other writings are to be found in the series of "Contributions from the Department of Neurology and Laboratory of Neuropathology of the University of Pennsylvania," these volumes being made up largely of reprints of articles published by members of the department in medical journals. In this paper he first discusses the centripetal and centrifugal blood supply of the spinal cord, and then presents in careful detail a clinical history, and the results of his examinations and histologic investigation. His conclusions favor the theory of the vascular origin of such well known spinal affections as the various forms of poliomyelitis, Friedreich's ataxia, disseminated sclerosis, paralysis agitans and tabes dorsalis.

A second article entitled "The Connective Tissue Character of the Septa of the Spinal Cord as Studied by a New Stain," appeared in the *Journal of Nervous and Mental Disease,* December, 1906. This paper is brief and is chiefly valuable as showing the tendency of the author to reach out into new fields. By means of the stain, the use of which is clearly described, Allen was able to demonstrate the fact that the posterior median septum of the spinal cord, as well as a number of the septa of the lateral columns, contain connective tissue which is continuous with the pia.

A third paper written in collaboration with Dr. William G. Spiller was published both in the *University of Pennsylvania Medical Bulletin,* March-April, 1907, and in *The Journal of the American Medical Association,* April 13, 1907. The subject was "Internal Hydrocephalus, with the Report of Two Cases, One Resulting from Occlusion of the

Aqueduct of Sylvius." In this contribution, after an excellent summary of the literature of the subject, microscopic and macroscopic reports of two interesting cases are given.

In 1907, the "Contributions of the Department of Neurology and Laboratory of Neuropathology" contained an article prepared in collaboration with the writer on "Two Cases of the Polyneuritic Psychosis with Necropsies and Microscopical Findings." This paper was read at the sixty-third annual meeting of the American Medico-Psychological Association, Washington, D. C., May 7-10, 1907. It was, in the main, a study of the probable etiology and pathology of Korsakoff's disease, and it contained brief references to other contributions.

A careful anatomic study was incorporated in a paper by Allen on the "Distribution of the Motor Root in the Anterior Horn," *University of Pennsylvania Medical Bulletin,* November, 1907.

Elsewhere I shall speak of Allen's ability as a musician and student of harmony. In one of his papers he applies this gift in describing "A New Diagnostic Sign in Recurrent Laryngeal Paralysis," *Journal of Nervous and Mental Disease,* 1908. The development of the sign was dependent on an observation of Allen that when the laryngeal paralysis was unilateral there was a very material difference in the upward excursion of pitch, if the vocal apparatus was stimulated electrically during the singing of a tone. The sign, as the author indicates, is of curious interest rather than of wide practical application.

One of Allen's most elaborate papers was that on "Injuries of the Spinal Cord," *University of Pennsylvania Medical Bulletin,* April, 1908. It covered between thirty and forty pages, and was profusely illustrated with photographs of gross specimens and photomicrographs. These illustrations, which represent some of the best work of the kind in the literature of neurology, indicate by their remarkable quality Allen's skill in photography.

The following is a list of other papers published by Allen between 1908 and 1914:

"The Symptom-Complex of Transverse Lesions of the Spinal Cord and Its Relation to Structural Changes Therein," *American Journal of the Medical Sciences,* May, 1908.

"Delayed Apoplexy (*Spätapoplexie*), with the Report of a Case," "Contributions from the Department of Neurology and Laboratory of Neuropathology, University of Pennsylvania," 1908.

"Hemorrhage into the Ventricles, Its Relations to Convulsions and Rigidity in Apoplectiform Hemiplegia," *The Journal of the American Medical Association,* July 18, 1908.

"Special Features Concerning Multiple Neuritis," *University of Pennsylvania Medical Bulletin,* November, 1909.

"Concussion of the Brain," *The Journal of the American Medical Association,* September 10, 1910.

"The Histopathology of the Preparalytic Stage of Acute Anterior Poliomyelitis," *Pennsylvania Medical Journal,* December, 1911.

"Surgery of Experimental Lesions of Spinal Cord Equivalent to Crush Injury of Fracture Dislocation of Spinal Column (Preliminary Report)," *The Journal of the American Medical Association,* September 9, 1911.

"The Effect of the Removal of the Hypophysis in the Dog," written in collaboration with Dr. Joshua Edwin Sweet, *Annals of Surgery,* April, 1913.

"Remarks on the Histopathological Changes in the Spinal Cord Due to Impact," *Journal of Nervous and Mental Disease,* March, 1914.

These articles all contain material worthy of record, and some of them are especially notable, as for instance, those on delayed apoplexy, hemorrhage into the ventricles, on the surgery of experimental lesions of the spinal cord, on the histopathologic changes in the spinal cord due to impact, and the effect of the removal of the hypophysis.

As the result of the investigations incorporated in his papers on spinal crush injuries and on the histopathologic changes in the spinal cord due to impact, Allen suggested an early operative procedure in severe spinal traumatisms, which was afterward put into successful practical application by Dr. C. H. Frazier. This consisted in a median longitudinal incision directly through the injured area of the cord. The physiology of the beneficial action of this incision was ascribed by Allen "to a draining of the cord at this point of blood and serum, and thereby not only preventing the pressure of this exudate on the nerve elements, but also removing what would in time, through chemical change, give rise to a biochemical irritation with destruction of tissue."

During Allen's stay in England in 1913, he did some laboratory work on the cerebellum. He again took up cerebellar research after his return to this country, but this work was interrupted by the war.

Besides the contributions of Allen thus hastily summarized, he delivered able presidential addresses on some phases of psychoanalysis before the American Psychopathological Association and the Philadelphia Neurological Society.

Allen collaborated with Dr. Charles H. Frazier in the production of his work on "The Surgery of the Spine and Spinal Cord," published in 1918. For this book he wrote an excellent chapter on the "Normal and Pathological Physiology of the Spinal Cord," and in other ways was associated with Dr. Frazier in the preparation of the volume.

Allen was a lover of music and a close student of harmony. When very young he composed an opera, both words and music. He was the author of many songs, some church music and an overture.

He organized the Savoy Opera Company for the amateur production of Gilbert and Sullivan's operas. This company gave as its first performance "Trial by Jury," in May, 1901, and is still successfully

producing a Gilbert and Sullivan opera each year. During his active connection with the company Allen trained all the cast and chorus, and conducted the orchestra.

He wrote the music for a Christmas carol, the words for which were furnished by the Rev. Louis F. Benson. He also wrote the music for one of the hymns of the war hymn-book entitled "For God and Country."

Allen was the musical editor of the revised edition of "The Hymnal," of which Dr. Benson was the editor-in-chief. "The Hymnal" was published by authority of the General Assembly of the Presbyterian Church in the United States, 1911. Allen's duties as musical editor were to revise the harmonies of the tunes, a work for which he was peculiarly well fitted. He wrote for the hymnal several new hymn tunes and several chants.

Although Allen never took a lesson on the piano, his knowledge of the theory of music and his natural musical gifts were such that he could play with ease, fluency and grace. He was also an excellent violinist.

Among Allen's many gifts was that for languages. He was an earnest student of the origin of languages and had much facility in acquiring a language, for the purposes of speaking and reading it. It was said of him by one who knew him well that "he thought no more of studying a new language than a lawyer of undertaking a new case." This facility was assisted by his powers of concentration on any subject which he had in hand. He was an industrious collector of books on languages. During his travels abroad in Belgium, Holland, France, Germany and Italy, he was in the habit of getting the school-books of the places visited, studying by their aid the history, features and customs of the countries through which he was traveling.

As illustrating his powers of concentration, one of his intimate friends writes:

> "This was shown by his enthusiastic work in higher mathematics which he developed under the stress of coming into contact with the problems of modern gunnery, thus promoting an efficiency in that department, which enabled him to become the commandant of the Infantry School of Arms, a position which he held for a short time."
>
> "Perhaps the quality in Major Allen's mental constitution that most impressed a fellow student," says the same friend, "was the great width and variety of his accomplishments, each one of them pursued with so much intensity and yet at the same time made to cohere and co-operate by the perfect sanity of his mind and the catholicity of his interests. He was at once absorbed in the particular work that employed him, but with a mind so disciplined that not only every pursuit but every fact was kept in its own pigeon-hole, and he himself was able to pass from one to another with the least possible mental friction."

Allen was a skilful photographer and a good pen-and-ink draftsman. At one period he acted as photomicrographer at the medical laboratories of the University of Pennsylvania, producing work of much technical excellence for publications issued by some of the departments. His own papers were sometimes illustrated by original photographs and drawings of unusual merit.

Besides his medical photography, Allen did fine work in general photography. When the writer of this article was engaged in a local historical research, covering a district of Philadelphia, Allen sometimes accompanied him on his trips, taking beautiful landscape and other photographs.

From the time when, in 1914, Belgium was invaded, Allen had a strong feeling that it was his duty to serve the cause of liberty against German aggression.

When the training camp was organized at Plattsburg, N. Y., he was one of the first to go there. He went in August and September, 1915, and again in August and September of the following year. During his stay at Plattsburg he was commissioned first lieutenant in the reserve corps, and in October, 1916, was commissioned major. After war was declared he was ordered to the training camp at Fort Niagara, where he spent the summer of 1917. In the fall of 1917, he was transferred to Camp Meade, Md., where he remained a short time and then was sent to the training school at Fort Sill, Okla. He returned to Camp Meade where he became director and, for a short time, commandant of the School of Automatic Arms in the Infantry School of Arms of the Seventy-Ninth Division. He was made major of the 314th United States Infantry and arrived in France with his regiment in July, 1918, which was in a brigade commanded by Brigadier-General Nicholson, being a part of the Seventy-Ninth Division under the command of Major-General Joseph E. Kuhn. The division was a part of the Fifth Army Corps of the First American Army. All his military duties were faithfully and efficiently rendered, and he was beloved alike by the officers and men of his battalion. The time and manner of his death have been mentioned at the beginning of this sketch. I saw him last in January, 1918, when he was on a visit to Philadelphia from Camp Meade. He talked seriously of the great task which confronted the allies, but was full of ardor and enthusiasm and related to others and myself of the company where we met, many interesting details of his recent military experiences.

The high esteem in which Major Allen was held by those familiar with his military career is shown in two letters to his wife regarding him — one by a fellow officer, Capt. Frederick A. Muhlenberg, U.S.A., and the other by Fullerton L. Waldo, the well known journalist.

Captain Muhlenberg writes as follows:

What a sense of loss we all feel. The Major was always sympathetic and kind to the officers in the regiment and helped them at all times by any powers at his command. I have always believed that his nerve in choosing the infantry, with his special knowledge and willingness to share it made a real case of "the greatest good for the greatest number." His thoughtfulness for others and quick thinking under harassing conditions have set us a true example of the perfect soldier.

I feel a very deep sense of personal loss. I was under the Major at Niagara, where he was very kind to me. At Camp Meade I was his adjutant in the early days and quickly came to recognize his great ability and charm. Over here I have often been honored by his confidence and I really feel that I have lost a close and dear friend.

While I was evacuated too soon to learn the details of either his death or burial (I got a bullet-scrape on the side of the head and various burns from mustard-gas) I am sure, from the universal expressions of regret which I heard on the way back (from the regimental commander to some of the "buck privates" in the rear rank of the battalion) that all the honors which could be paid him were paid. Major Allen had the universal love and respect of all who knew him. Your children have been given a great heritage.

Mr. Waldo writes:

I may not lay claim to the deeper intimacies of Major Allen's friendship, but wherever and whenever his life touched mine I felt the inspiration. The first time was when he wrote out for me offhand a musical score from memory. Again, at drill under the trees at Rosemont his explanations of maneuvers were brilliant and disclosed his real and rare ability as a leader of men.

At Plattsburg he was a joy to all who heard him talk, and his ministrations to men footsore by the long and heavy marches won the gratitude of a host. I was always comfortable under the most trying conditions because I strictly followed his injunctions.

When last spring I spoke at Camp Meade, there he was, sitting in the front row to encourage me. He of all men, who knew a thousand times more of warfare than I could ever hope to tell him from the brief page of my experience abroad!

An extraordinary versatility that ran no risk of being superficial; a shrewd insight that never hurt the feelings of others; a quick sense of humor; a passion for scholarly analysis without pedantry; the graceful *savoir-faire* of a man of the world united to every finer sensibility of feeling — these were some of the characteristics that marked Major Allen and that now must bring you, in the midst of loss irretrievable, a legacy of precious memories of the noble man of nature that he was. Words have no wings in such an hour, and yet it is something to you to feel that besides God's infinite mercy you have the commiseration of those who stand with you uplifted, in the black hour of grief, by the exemplary life and death of a soldier and a gentleman — martyr and hero for the sake of us all.

Major Allen is no longer with us. Regard for his memory is united with deep sympathy for his family, but one may not intrude too far with words of condolence, always so difficult, on the intimacy of the grief of those who mourn for their beloved. Speaking for his medical

associates and especially for his neurologic colleagues, I can testify to the high esteem and affection in which he was held. His brethren of the American Neurological Association will miss his inspiring presence. The secretarial work of the association was never done so well and thoroughly as during the period of his official connection. At the annual dinners of the association he was the enlivening spirit, charming those present with his rhythmic and musical improvisations.

While Major Allen was not a society man in the accepted use of the designation, he had social gifts which made him a delightful companion in the drawing room and at the festive board. He enjoyed conversation. Music, poetry and the quick interchange of thought had for him a strong appeal. He was a fluent and eloquent talker; quick at repartee, and earnest in argument. His wit was incisive; his irony gentle; his humor genial. He yielded his life in a cause which appealed to his inmost nature. Gone from our midst, in spirit he is still with us.

"Fame is the spur that the clear spirit doth raise
(That last infirmity of noble minds abhorréd)
To scorn delights and live laborious days;
But the fair guerdon when we hope to find,
And think to burst out into sudden blaze,
Comes the blind Fury with the abhorred shears,
And slits the thin-spun life. 'But not the praise,'
Phœbus replied, and touched my trembling ears:
'Fame is no plant that grows on mortal soil,
Nor in the glistering foil
Set off to the world, nor in broad rumour lies,
But lives and spreads aloft by those pure eyes
And perfect witness of all-judging Jove;
As he pronounces lastly on each deed,
Of so much fame in heaven expect thy meed.'"

Abstracts from Current Literature

THE NATURE OF NERVOUSNESS IN SOLDIERS. Foster Kennedy, J. A. M. A. **71**:17, July 7, 1918.

The essential of this paper is a discussion of the dynamic factors which cause war neuroses, which Kennedy prefers to call nervousness, and for which he considers the term "shell shock" to be particularly inappropriate. He starts from the fact that these neuroses do not develop in men who have sustained physical injuries. He thinks that the dynamic force in the production of the nervousness is the antagonism between the conscious emotion of loyalty, with its concomitant urge for self-sacrifice, and the more or less well-repressed instinct for self-preservation with its shrinking and fear of death. Careful inquiry revealed the fact that being wounded is apt to be followed by a period of mental rest, because the patient is quit of his obligation to others and freed from his fear of death; in other words, both his social instinct and his instinct for self-preservation are satisfied; on the other hand, a man who suffers from stupefaction consequent to heavy shell burst without being wounded still has the obligation to persevere. In such a case the instinct for self-preservation becomes the stronger and the patient becomes fearful, etc.

He takes up the fact that some medical officers claim the coexistence of psychoneurosis and somatic injuries, but affirms that they are speaking of patients who have been transferred to England, while if the patients are seen early, the combination is rare, and when it occurs later it is probably due to psychogenic causes and unwise treatment.

He also mentions localized injuries and speaks of the fact that, in his experience, almost all injuries to extremities are accompanied, for a short period at least, by palsy of the limb, quite apart from any organic nerve injury, and urges that the capacity to make a careful neurologic examination and to feel perfectly certain regarding the differential diagnosis between a functional and organic condition is absolutely essential for the proper treatment, because any doubt expressed by the physician sows the seed for a fixed idea.

He finally speaks of the fact that we are indebted to Freud for the realization that neurotic symptoms may be produced by the antagonism of mutually incompatible emotional trends, and that these psychoneuroses in soldiers furnish a good evidence of this; that they are, however, also an excellent illustration of the fact that the freudians have gone much too far with their pan-sexualism. The latter is probably true, but it seems hardly fair to adduce these war neuroses as an argument against the freudians in this respect, because probably even a dyed-in-the-wool freudian would frankly accept the totally different etiology of these cases from those of the peace neuroses and agree that in these war neuroses a different instinct is at work and one which is but little threatened in ordinary life nowadays.

He ends by saying that he has only dealt with the psychologic aspect of the problem without being unmindful of the physical changes which accompany violent emotional disturbances and which result in alterations of the physiologic balance of the involuntary nervous system, in regard to which we are not sure whether they are primary or secondary.

Hoch, Santa Barbara, Calif.

STIMULATION OF THE MOTOR CORTEX IN A MONKEY SUBJECT TO EPILEPTIFORM SEIZURES. C. S. SHERRINGTON, M.D., F.R.S., Brain, **41**: Part 1, p. 48, June, 1918.

The author, stimulated by means of a unipolar faradic current the motor cortex of a "Jew" monkey (*Macacus fuliginosus*) subject to epileptiform seizures which probably began in the tongue, but which appeared to begin in the left angle of the mouth and spread to the facial muscles, neck, arm and leg of the left side and then to the right side. Attacks were induced by taking into the mouth large morsels of food.

Abnormal reactions were obtained nowhere except in the "tongue" areas of both hemispheres, especially in the right where the briefest stimulation produced maximum contractions of the tongue which by no persistence of faradization could be made to extend beyond the face. No gross lesions or abnormalities were visible in the cortex.

These experiments are unusual in that (1) it is, according to the author, the first recorded instance of faradization of the cortex of an animal suffering from idiopathic epilepsy, and (2) in that the nature of the responses to stimulation of the "tongue" area were not only unusual, but were more readily evoked in an area of the brain which usually fails to easily produce epilepsy on stimulation. WEISENBURG, Philadelphia.

PREDISPOSING FACTORS OF WAR PSYCHONEUROSES. JULIAN WOLFSOHN, J. A. M. A. **70**:303, Feb. 2, 1918.

Pearce Bailey writes a short introduction to this paper from which we may quote the fact that nowadays 85 per cent. of the English soldiers are no longer returned to English special hospitals, but are treated near the line, since it has been found to be better not to release them from military discipline; also that the chief method of treatment is now strong persuasion, with electricity given for its psychic effect.

Wolfsohn's study was made at the instigation of Mott. He studied 100 cases of war neuroses and 100 cases with somatic injuries which he used as controls. In these two groups he compared the family history, the patient's make-up, the personal history and some other factors.

He showed that nervousness, irritability of temper, insanity and epilepsy were much more common in the family history of the neurotics than in that of the controls. Rather striking is the fact that insanity and epilepsy occurred in the neurotics in 34 and 30 per cent., respectively, while it did not occur in the controls at all. As regards the personal history, it was found that previous nervousness was present in 66 per cent. of the neurotics (12 per cent. of the controls); fears in 50 per cent. of the neurotics (8 per cent. of the controls); moodiness in 55 per cent. of the neurotics (8 per cent. of the controls).

Of some interest are the experiences with alcohol. In the family history, alcoholism occurred in 50 per cent. of the neurotics (24 per cent. of controls); but in the personal history it occurred in only 6 per cent. of the neurotics (16 per cent. of the controls). There were 30 per cent. teetotalers in the family history of the neurotics (only 16 per cent. in the controls), and 48 per cent. teetotalers among the neurotics themselves (20 per cent. among the controls).

Wolfsohn mentions the fact, also pointed out by Kennedy, that none of his cases of war neurosis had a somatic wound, the usual history being that a shell burst near the patient, who was knocked over or buried or just dazed, after which the neurosis followed. The symptoms had, however, developed gradually before this final precipitating cause, inasmuch as such patients were

for weeks easily fatigued, "nervy," had frightful dreams, complained of loss of self-confidence and the like.

A few other comparisons are of interest: He states that the control cases do not look nervous, do not have cold, clammy hands, or insomnia or depression of spirits—all of which are frequent in the neurotics. A prolonged dazed period followed the explosion in 84 per cent. of the neurotics and in only 24 per cent. of the controls. Poor memory and concentration were present in 88 per cent. of the neurotics and in only 4 per cent. of the controls. In the wards with neurotics an air raid or even a thunder storm brings about trembling, nervousness and headaches in the patients, which are quite absent in a surgical ward.

HOCH, Santa Barbara, Calif.

A NOTE ON THE OCULO-CARDIAC REFLEX. R. M. STEWART, Rev. Neurol. and Psych., **16**:67, March-April, 1918.

The author cites a case of bullet wound of the right side of the neck accompanied by signs of involvement of the right cervical sympathetic in that there was exophthalmos, myosis, anidrosis and some ptosis on that side. From this accidental situation, he endeavors to draw conclusions based on experimentation, of the centrifugal path and controlling mechanism of the oculo-cardiac reflex. Pressure on the eyeball of the left unaffected side was succeeded by a slowing of the pulse rate from 76 to 52 per minute; on the right side there was little if any slowing, but no acceleration. This would be according to rule providing it could be shown that the vagus of the right side were either badly injured or divided. But from collateral observations, namely, that there was no palatal paralysis and that the intrinsic muscles of the larynx on the right side were unaffected, he concludes that the vagus was not injured and hence the oculo-motor reflex absence on the right must have been due to destruction of sympathetic fibers. That is to say, the oculo-motor reflex depends on both the vagus and sympathetic being intact, and not only on the vagus.

But his deductions do not seem warranted, as the number of unknown factors in the accidental picture were too many. His assumptions of alternative routes of travel of the impulse from eyeball via sympathetic and vagus alone make any definite conclusion impossible. Yet the article makes interesting reading for the speculative neurologist.

TIMME, New York.

THE WAR NEUROSES. W. B. TERHUNE, J. A. M. A. **70**: 1369, March 11, 1918.

Only a few points in this article need be mentioned. Terhune claims that 25 per cent. of the cases he examined had had "shell shock" previously, says that the claim shell shock does not occur among the wounded is a mistake, and that he has often seen mild cases among the latter. He admits, however, that severe cases are comparatively rare. He gives an analysis of the frequency of certain symptoms in 100 cases, of which we will mention a few. Headache was found in 85 per cent.; tremors in 70 per cent.; insomnia in 62 per cent.; vertigo in 55 per cent.; debility in 44 per cent.; a period of unconsciousness in 41 per cent.; tachycardia in 26 per cent.; but apprehension in only 14 per cent.; memory defect in 14 per cent.; depression in 12 per cent.; mutism in 11 per cent.; confusion in 4 per cent. He also mentions the fact that the patients are very emotional, and the frequency of cyanosis of the hands. Studies of blood pressure in 200 cases showed that the blood pressure and the pulse rate in severe cases were usually higher than in milder cases, and that there was a noticeable vasomotor irritability in most instances. With improvement, the blood pressure fell. There were, however, also severe cases in which blood pressure and pulse were never above the normal.

HOCH, Santa Barbara, Calif.

EXHAUSTION PSEUDOPARESIS. J. RAMSAY HUNT, J. A. M. A. **70**:11, Jan. 5, 1918.

Hunt found in a training camp for officers, among 1,500 men that were examined, eleven men who showed beginning paresis or early cerebral syphilis. In all these cases the diagnosis, which was confirmed by serologic findings, was made largely on physical symptoms, the men presenting no mental symptoms and having attracted no attention either by their behavior or their work. But there were three or four men with similar physical symptoms and even certain mental manifestations in whom, however, the serologic findings were absolutely negative, while a week's rest removed any suspicious symptoms. The cases were men over 30 who had not been used to physical exercise, had been in camp for about a month, where they underwent strenuous training and for some time before the symptoms appeared had arduous work at digging of trenches. The following conditions were usually found: a flushed face, a speech defect which was characterized by tremulousness, a certain amount of dysarthria and considerable "syllable stuttering," marked tremor of the facial muscles when the eyes were closed and the teeth shown. There was also tremor of the hands and tongue. The pupils were apt to be moderately dilated and unequal, and the reaction to light either entirely absent or very slight and sluggish, whereas accommodation was normal. In one case the handwriting is mentioned as irregular and tremulous. The tendon reflexes were usually active and equal, but in one case diminished and unequal. Mentally, in Case 1, the patient appeared dull, somewhat dazed, slow of comprehension, slow of response, and he showed difficulty in calculating and made occasional errors, all of which was in marked contrast to his education. In Case 2 it is merely stated that the patient was mentally somewhat dull. In Case 3 the patient showed mentally no defect, but was somewhat "euphoric and irritable," and in Case 4 the patient showed nothing in his mental condition except that he complained of nervousness and insomnia. All these patients showed absolutely negative serologic findings, and the suspicious symptoms disappeared after a week's rest. It may be added that the pupil examinations were made very carefully, both in daylight and with electric light; that Hunt refers to Redlich, who showed that after violent muscular effort the pupils may dilate and become rigid to light, and to Bumke's claim that in simple exhaustive states the pupils may be dilated and may be sluggish to light, while accommodation reaction is preserved. Hunt also points out that tremor is a well-known symptom in fatigue, as is also diminished concentration and diminished capacity for mental operations. He adds that he has never seen any such case in civil life.

HOCH, Santa Barbara, Calif.

THE INTERDEPENDENCE OF THE SYMPATHETIC AND CENTRAL NERVOUS SYSTEMS. DAVID ORR and R. G. ROWS, Brain, **41**: Part I, p. 1, June, 1918.

From their experimental studies in rabbits and studies on neuropathologic material afforded by visceral cancer, Addison's disease and combined sclerosis, the authors are convinced that the type of lesion, namely, the distribution of the degeneration in the lateral and posterior columns, especially the localization in the middle part of the cord, diminution of changes from above downward, and the integrity of the gray matter, is not accidental but is dependent on the fact that this region obtains its blood supply from the pia-arachnoid vessels. They support their view that this localization is due to the mediation of the

sympathetic nervous system by the evidence of recent anatomic, physiologic and embryologic work. From D-1 to L-1 the intermedio-lateral tract of the cord completes the arc between the afferent and efferent sympathetic systems (the region of the lesion found). Evidence is gathering that the chromaffine system is derived from ectodermal structures.

The relation of the autonomic system and adrenal secretion is known. The fact that Addison's disease is due to adrenal insufficiency leads them to suggest that all the lesions in the cord of this variety are due to vasodilatation of the pial vessels through autonomic activity.

In discussing the relation of the vascular system to nerve cells they review the recent views that the neuroglia is an internal secretory gland and is associated with the emotions (Achúcarro); that abnormal emotions arise from disturbed humoral balance (Lugaro); that psychogenetic factors of the functional neurosis are attended by somatic factors (von Monakow); that the cortex is divided into sensory motor regions with psychic functions and is intimately connected with sympathetic centers. They suggest that hypo function of the sympathetic is responsible for most signs in the neuroses, but that vagal hypertonia may be responsible for anesthesias, aphonias and vomiting.

The experimental and pathologic work is interesting and suggests a line of investigation which will take neurologic study out of the realm of a nerve description, but the theoretical discussion, while it is interesting and suggestive, is not conclusive. HOHMAN, Baltimore.

[The pial vessels are not known definitely to be dilated in autonomic activity —if by autonomic is meant the portion of the vegetative nervous system opposed to the sympathetic. In fact, the abdominal vessels in such activity are dilated markedly leading to the secondary collapse of pial vessels. Such collapse may readily cause the cord changes described.—ED.]

DIE PSYCHOLOGISCHE RICHTUNG IN DER PSYCHIATRIE (The psychologic point of view in psychiatry). E. BLEULER. Paper read at the meeting of the Swiss naturalists in Zürich, 1917. Schweiz. Arch. f. Neurol. u. Psychiat. **2**, II, p. 181-201, 1917.

It is always interesting to hear what a man of Bleuler's capacity has to say about general questions, even if he has said before most of what we find in this article. Space permits us to pick out only some features of this interesting paper. He shows that the study of hypnotism has been the real starting point for a deeper psychologic understanding of mental disorders, and that we owe a great deal to Janet for making the unconscious more generally understood. Bleuler defines unconscious processes as "all those processes which go on without the quality of consciousness, but which otherwise are identical with conscious processes." Later he takes up Freud. He thinks the essential of the freudian teachings is the claim that many symptoms arise from some psychic need of the patient. The latter creates a substitute for some unattainable satisfaction and he even states that most of these needs are in the sense of Freud sexual. The patient with a neurosis does this, according to Bleuler, by becoming sick in order to escape the struggle of life or in order to force the family to occupy itself with him, while in a psychosis the patient gets into what he calls a more or less delirious state in which his wishes are fulfilled in fancy. [The word delirium is unfortunately not any too well defined in psychiatry, but what Bleuler here means is evidently a state with abnormal ideas and a more or less pronounced exclusion of reality.] Bleuler also admits with Freud the great importance of unconscious processes and states that most pathogenic

mechanisms go on without awareness of the patient. However, one of the important facts to be familiar with in order to understand these unconscious processes is that the thinking in this realm is not logical, but what Bleuler himself some years ago called autistic (in contradistinction to realistic) thinking. If we compare logical thinking with autistic thinking we find that in the latter *affective needs* take the place of logic, and that instead of clear concepts we find symbols and similarities. Autistic thinking he regards as the primitive and assumes that logical thinking has gradually developed and has replaced the autistic as a result of increasing knowledge. He also endorses other claims of Freud, such as the repression of disagreeable ideas, the transference of an affect from one idea to another, the condensation of several ideas into one, the conversion of a repressed affect into a physical symptom. All these phenomena are not created by the disease *de novo,* but many are merely special forms, exaggerations, caricatures of the action of affects which have long been known to exist in the normal. Later he speaks at some length of the importance of affectivity in normal and abnormal states, which is far from being adequately appreciated. On the other hand, he expresses his inability to follow Freud in his views regarding the development of sexuality, and also in his too exclusive pan-sexualism, while he justly regards Adler's views as even more onesided.

So far as schizophrenia is concerned he reiterates his view that it is fundamentally a toxic disorder, but adds that sexual complexes determine much of the symptomatology. Later he states that many symptoms of schizophrenia which we regarded as direct expression of the disease process have become deprived of this dignity owing to our understanding of psychic forces. They prove to be the result of normal mental mechanisms working under changed conditions which in the case of schizophrenia is brought about by Bleuler's "association disorder." Indeed, he admits that the *outbreak of the acute psychosis in schizophrenia often has nothing whatever to do with the disease process.* Therefore, the "disease" must not be looked for in the hallucinations or in the dementia, but in the brain changes which have produced the association disorder. This knowledge (or as we would like to say at any rate the recognition of psychogenic factors in dementia praecox) is extremely important for therapeutics. It is also important from other points of view; for example, for the study of heredity. Obviously if external situations and not the disease process as such often produce the psychosis, many persons who are latent schizophrenics do not come under observation, and the hereditary disease is much more frequent than the obvious disorder (the phaenopsychosis as Bleuler calls it). He ridicules the childish simplicity with which many heredity studies have been carried on, and thinks that one of the reasons for the barrenness of results is precisely the fact that the difference in the frequency of the heredopsychosis and the phaenopsychosis has not been appreciated. The difference also explains why parents and children are rarely schizophrenic in the same degree, since grave schizophrenics seldom marry; but the latent schizophrenics are, from the point of view of heredity, just as important as the grave ones. All this, of course, makes the study of heredity extremely difficult.

He then devotes considerable space to discussing the relationship of physical and mental causes and points out that usually both are combined, or that even in the same disease as, for example, in manic-depressive insanity, the cause may be now of one, now of the other type.

We should add that he speaks briefly of the war neuroses and regards them as well as the accident neuroses, in which damages are obtainable, as purposeful neuroses, that is, as disorders which accomplish an end, to be sure often unconsciously desired.

Hoch, Santa Barbara, Calif.

Society Transactions

AMERICAN NEUROLOGICAL ASSOCIATION

Annual Meeting, May 9 and 10, 1918, Atlantic City, N. J.

THEODORE H. WEISENBURG, M.D., *President*

DR. WEISENBURG delivered the presidential address

DR. WALTER F. SCHALLER, San Francisco, read a paper entitled, "A Case of Complete Division of the Spinal Cord in the Lower Dorsal Region with Conservation of Spinal Reflexes Below Level of Lesion."

An adult male rendered totally paraplegic following fracture of the tenth dorsal spine and consequent lesion of the cord. First observed one year and three months after injury. Examination disclosed exaggerated inferior tendon reflexes accompanied by pathologic pyramidal tract signs, marked defense reactions, increased tonus and patellar clonus. Total absence of voluntary motion in lower extremities. Paralysis of sphincters, decubitus ulcers over both hips. Absolute anesthesia below the eleventh and twelfth dorsal segments. Because of the motor phenomena a compression of the cord was suspected and a laminectomy done by Dr. Emmet Rixford, Feb. 3, 1917. A complete division of the cord tissue proper was found. The ends of both cord fragments were trimmed off and preserved for future examination. An effort to suture the two ends of the spinal cord was made and found impossible. Reexamination Feb. 22, 1917, nineteen days after operation, showed the same clinical signs as before operation. Details and discussion of physical findings. Significance of this case and similar cases previously reported in reference to Bastian's Law and compression syndrome.

DISCUSSION

DR. CHARLES K. MILLS, Philadelphia, said that this paper had been of great interest to him, not the least so because of the recital of Dr. Schaller's own case which is rather in antagonism to views which Dr. Mills has held and expressed before this association. He had no desire to challenge the report of the case, but believed perhaps it was an instance in which the exception proved the rule. His own experience had been that complete transverse lesions of the cord, those which he had observed being chiefly above the lumbar enlargement, had resulted in the loss of the deep reflexes and an almost entire absence of tonicity. Tonus, Dr. Mills believed to be cerebral in the human being, cerebral rather than cerebellar or spinal, although he did not hold that the spinal cord had no effect whatever on tonus, a subject into which he could not go here. In his mind the absence of the deep reflexes in complete transverse lesions of the cord was dependent on the withdrawal of cerebral tonectic impulses.

DR. H. DOUGLAS SINGER, Kankakee, said he would like to refer to an experiment made by Dr. James Collier of London, some years ago, which he did not think had ever been published in connection with a case of this kind. A man who had a flaccid palsy, with absent reflexes as the result of the traumatic separation of the cord, was submitted to faradization of the quad-

riceps, the needles being inserted in the muscle. There was return of the knee jerk and the man subsequently became spastic and continued so for several months before his death.

Dr. Alfred Gordon, Philadelphia, stated that several years ago in the *American Journal of the Medical Sciences*, he published the report of a case of tuberculoma of the spinal cord in which the lesion was found extending from the fifth cervical to the eleventh dorsal. The microscopic study of the case showed there was a great deal of preservation of spinal cord tissue, but much degeneration of the white matter. The tumor was located on both sides. The clinical history showed, from long observation, that from the beginning of the symptoms until the end there was absolute loss of reflexes. Knee jerks, ankle clonus and toe phenomenon were all absent. Dr. Schaller's case is one in the opposite direction. Both cases, he believed, showed that the spinal cord alone could not be considered in discussing the question of pathogenesis of reflexes. In Dr. Schaller's case there is no question that the higher centers were involved. In Dr. Gordon's case there was great preservation of the spinal cord tissue. Dr. Gordon believes that Grasset's view is more tenable than any other. He believes that the reflexes are dependable not only on the spinal cord, but also the medulla oblongata and the cerebrum.

Dr. Walter F. Schaller, in closing the discussion, said that in reply to what Dr. Singer said of Collier's work he referred to this work in his paper.

Dr. J. Ramsay Hunt, New York, read a paper entitled, "Preliminary Report on a Cortico-Neural and a Strio-Neural Motor System in Peripheral Nerves."

A discussion of the evidence indicating the existence of two distinct physiologic *systems* of motor fibers for the conduction of efferent impulses in peripheral nerves.

1. A system for the conveyance of motor impulses, subserving the higher functions of motility, as represented by isolated synergic movements of cortical origin.

2. A system which is phylogenetically older for the passage of motor impulses, of striospinal origin, subserving the function of automatic and associated movements.

The corticoneural system is related to the pyramidal tract system, and dissociated movements of cortical origin.

The strioneural system is related to the extrapyramidal motor system, and associated movements of striatal origin. A consideration of this conception of the final common path and its relation to problems of reeducation and regeneration after injuries of peripheral nerves.

DISCUSSION

Dr. Israel Strauss, New York, asked whether he understood Dr. Hunt correctly that the musculospiral nerve, in the case he first cited, was cut across and that there was no regeneration of fibers, because if that is the case how does he explain the impulse coming down through the peripheral nerve to this muscle if this muscle has been destroyed. How can an impulse even from the corpus striatum come down to this muscle if this nerve is destroyed? Unless he wishes to assume that possibly some of these impulses come out by way of the sympathetic system to the muscle group, which is taught by some.

Dr. Elmer E. Southard, Boston, read a paper entitled, "An Extension of the Key Principle of Diagnosis to the Genera in Certain Great Groups or Orders of Mental Disease."

The reader presented, along the lines of the key principle offered to the association last year, some applications to the main subdivisions of the chosen groups (syphilitic, feebleminded, epileptic alcohol, drug and poison, focal encephalic, somatic (nonnervous), senile-senescent, schizophrenic, cyclothymic, psychoneurotic, and residual psychopathic). The plan is that in the logical analysis for diagnostic purposes of data that have already been collected in a given case, there shall be an arbitrary confrontation and elimination or choice of genera in a certain selected order. The principle of precedence in this order is the practical principle of availability and reliability of tests and symptom groups.

The reader offers not so much a new classification of mental diseases as a method of arriving at a diagnosis of some one of the recognized entities. The principle is perfectly applicable, for example, to the group of entities worked out by the American Medico-Psychological Association and adopted by the Surgeon-General, U. S. A.

DISCUSSION

Dr. Lewellys F. Barker, Baltimore, said he was very glad to hear this paper by Dr. Southard and to participate in the discussion. He thought a great deal more attention should be paid to these logical considerations in diagnosis. It seemed to him that Dr. Southard had done us a distinct service in bringing the subject forward. He hoped that in succeeding meetings he would have more to say about the subject of logical diagnosis. It is a subject to which Dr. Barker had given a good deal of thought in connection with clinical teaching and in consultation practice. In December, 1917, in an address before the New York Academy of Medicine, he had himself dealt with this subject. The order to be followed in medical diagnosis is really the order that is followed in all reflective thinking. There is a series of steps in all reflective thinking. In the first place we are confronted by a problem to solve. We feel a perplexity. The second step is to suspend our judgment until we collect enough data to localize and more accurately define the diagnostic problem. We teach students to make a general physical and psychical examination, to have a certain number of roentgen-ray tests made, to make a series of laboratory tests and to call on specialists in particular domains (rhinologists, ophthalmologists, dentists, orthopedists, neurologists, psychiatrists, gynecologists, etc.); and only after we have gathered the data together are we prepared in the more obscure cases to localize our diagnostic problem. After getting the data together, the next step is to arrange the data according to their similarities and sequences. It is helpful to arrange the findings then according to systems—circulatory, respiratory, digestive, urogenital, locomotor, nervous, metabolic, endocrine, etc. In the collection of facts by observation one does not allow himself to think too much of the final diagnosis. After collecting the data, we stop observing temporarily and begin to think, and that is a process in which diagnosticians differ most—in Dr. Barker's opinion. We allow suggestions of solution of the diagnostic problem to occur to us; we leap from the facts to inferences. Some of us, in this process, have too many suggestions. Others of us have too few. The best kind of diagnostic mind is one in which a sufficient number of possible suggestions of solution occur, but not too many. After we have permitted these suggestions to occur we take the next step;

we reason about them; we see what are the full bearings and implications of each of the suggestions. If the idea of typhoid fever occurs to us we recall our knowledge of the disease gained from our own experience and from the literature and see whether the data before us correspond with it. If the idea of schizophrenia occurs to us, we ask ourselves what the findings might be if the idea is a correct one, and compare the actual findings with these. Very often further observation and experiment may become necessary in order to institute a satisfactory comparison. We may find that we have to make a multiple diagnosis to account for all the deviations from normal function that are present. By testing inferences, rejecting some and corroborating others, we arrive at a concluding belief. That is the series of steps: A feeling of perplexity, the localizing of the problem, the arrangement of the facts, the allowing of suggestions to come up in our mind as to interpretation, reasoning about these suggestions, further observation and experiment to test them, and final arrival at a concluding belief. If we follow this method of diagnosis conscientiously we shall get as good results as our knowledge and training will permit. It is some such plan as this, Dr. Barker felt sure, that Dr. Southard wishes to have followed.

Dr. Elmer E. Southard, Boston, wished to thank Dr. Barker for discussing his paper so kindly. He was glad to agree with him that diagnosis did not consist in the process of collecting data. He thought that most books on physical diagnosis had no more to do with the process of diagnosis than had the law of gravitation. If you teach a man how to percuss and auscult, you are not teaching him how to make a diagnosis; you are teaching him how to collect data to use in the process of making diagnosis. A great deal that the books call diagnosis was *gnosis.*

As to Dr. Barker's interesting method of diagnosis by localization, taking up cephalic, thoracic, abdominal, pelvic, brachial, pleural loci of disease, or taking up diseases from the standpoint of systems like the respiratory and secretory systems, Dr. Southard was inclined to consider that much of interest and value lay in Dr. Barker's method. However, he felt that the method could not be generalized and that precisely in mental diseases one would be at a loss if one confined himself to this localizing method. Much damage had accrued to psychiatry from the notion that mental disease is necessarily brain disease. Where, for instance, would personality be localized? One would surely need to take into account not merely the neurones but also the hormones, for whose importance Dr. Barker had pleaded so cogently of late.

Dr. Southard had brought general contentions of this sort before the Association of American Physicians. He would refer interested persons to the forthcoming paper.*

Dr. Samuel T. Orton, Philadelphia, read a paper entitled, "Histological Evidence of the Path of Invasion of the Brain in General Paresis."

Anatomic survey of the distribution of the lesions in paretic brains shows them, in the majority of cases, to reach their greatest severity in the areas fed by the branches of the internal carotid. In rare cases the greatest intensity is found in the area of distribution of the basilar artery (Lissauer's paresis). These facts suggest the vessels as the path by which the spirochetes reach the brain.

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* A paper shortly to be published in the *Journal of Clinical and Laboratory Medicine,* entitled: "Diagnosis per Exclusionem in Ordine."

The histopathologic evidence which alone accurately substantiates the diagnosis of paresis is not the destruction of the brain parenchyma but the widespread periarterial infiltration of lymphocytes and plasma cells. This has led to an investigation of the larger intracranial vessels before they penetrate the brain substance with the finding of lesions here in some cases comparable with those of the intracortical vessels. The lesions of the intracortical vessels are also quite similar to those described in syphilitic aortitis.

The development of the psychosis heralds the invasion of the brain parenchyma from the foci of chronic infection in the mesodermal vascular structures and its type is probably dependent on the balance between the destructive and irritative effects of this invasion.

The psychosis may be compared to the stage of cavity formation in pulmonary tuberculosis and the most hopeful time for treatment of general paresis is before the psychosis develops, that is, in the interval of years which occurs between the infection and the final brain invasion.

DISCUSSION

DR. S. P. KRAMER, Cincinnati, said that some years ago he was able to demonstrate in the living animal that the blood supply of the brain under physiologic conditions was divided into a carotid and a vertebral area, and that the blood going to these areas did not mix. He had for some years thought that syphilis of the nervous system was a metastatic process, secondary to end arterial syphilitic patches. That the incidence in a given case of paresis—bulbar, syphilis or caused by tabes dorsalis—might be determined by the location of the aortic syphilitic patches; which location might determine whether the syphilitic "emboli" were swept into the carotid, vertebral or spinal arteries. To this end he had asked the pathologist at Danvers' Hospital to save the aortas in cases of syphilis of the cerebrospinal axis and hoped at some future day to report the results of the examination of the material.

DR. LA SALLE ARCHAMBAULT, Albany, read a paper entitled, "Parenchymatous Atrophy of the Cerebellum."

Report of the case of a man who first came under personal observation at the aged of 56, presenting marked evidences of disordered cerebellar function. The onset dated back some twenty years or more, and all the symptoms had appeared very gradually and slowly increased in severity. The patient remained under observation for a period of almost eight years and eventually died of lobar pneumonia. A very complete examination of the entire central nervous system was made.

The clinical picture was characterized essentially by the following manifestations: cerebellar titubation, antiflexion of the trunk with tendency to antero-pulsion, abduction of the lower extremities and oscillations of the trunk while standing, more or less marked rigidity of the trunk and lower extremities, intention tremor of the head as well as of the upper and lower extremities, dysmetria and slight asynergy in the movements of all the extremities, but more marked on the right side, increased tendon reflexes without ankle clonus or Babinski phenomenon, slight nystagmic oscillations of the eyeballs on lateral excursion, slow and monotonous articulation with somewhat nasal intonation, but without definite scanning. Trophic functions, general sensibility and special senses normal.

Anatomic Findings: The entire cerebrospinal axis was normal with the exception of the cerebellum which presented a marked and perfectly sym-

metrical atrophy. Careful measurement showed that the volume of this organ was reduced approximately one-third. The brain-stem was examined by means of serial sections from the posterior wall of the third ventricle to the level of the motor crossway. The lesions were strictly limited to the cerebellar cortex, involved both the vermis and the hemispheres and were generalized though not everywhere of equal intensity. The lobules of the inferior surface of the hemispheres and of the inferior worm were less diseased than those of the superior surface. The right hemisphere was more seriously involved than the left. The most extreme changes were found in the superior worm and in the quandrangular lobules. The histologic lesions in the cortex consisted of atrophy of the molecular zone, disappearance of the Purkinje cells, atrophy and rarefaction of the granular layer. There was only moderate neurogliar hyperplasia, no vascular foci anywhere within the cortex, but vascular changes were found in the pial folds intercalated between the cerebellar folia. Lantern-slide demonstration of the brain-stem sections.

DISCUSSION

Dr. Lewellys F. Barker, Baltimore, said that the histologic picture presented was most interesting. The thing that impressed him most of all was the slightness of the changes outside of the cerebellum and especially the absence of changes in the nuclei dentati and in the brachia conjunctiva. Were there any changes in the cord at all? Did Gowers' tract show any changes?

Dr. J. Ramsay Hunt, New York, said that to him this was a very interesting contribution because of the relation of intention tremor definitely proven anatomically to have a connection with the cerebellum. Three years ago, before this association, Dr. Hunt reported what he thought was a new system disease related to the cerebellum. The affection was a gradual development of intention tremor extending over a series of years. It was the sole and only symptom. An analysis of the intention tremor, however, showed that it contained many of the components of a cerebellar disturbance, such as asynergia, certain forms of asthenia, Gordon Holmes' symptom and the like. Dr. Hunt christened this disease asynergia. He expressed the belief that it was due to the loss of the system in the neocerebellum, a system which has some control over voluntary movement and when this system is interfered with there results a curious hyperkinesis defect. Dr. Hunt said he would probably not have an opportunity to examine such a case as he had described. These cases are very rare and it would be only a peculiar conjunction of circumstances that would permit him to follow out to the end such an idea, but the presentation by Dr. Archambault made him feel very certain that we have in the cerebellum a system which, in pathologic change, may produce intention tremor, that intention tremor is intentionally and fundamentally a cerebellum symptom, and that asynergia progressiva is a definite disease.

Dr. Elmer E. Southard, Boston, said that Dr. Archambault's case, while, of course, of unusual interest anatomically, had interested him clinically. Many of the symptoms in Dr. Archambault's case were symptoms of the group which Dr. Southard had tried to collect under the name "symptoms of hyperkinesis by defect." Catalepsy was such a symptom. One was reminded of the contentions of Kleist about the relations of the fronto-cerebellum apparatus to catatonia. There was too much of a tendency in neurology to feel that if a neuron got killed and lost out of an apparatus, there must be a constant and uniform symptomatic result in the form of some particular paralysis. In point

of fact, organic lesions produced very variable clinical symptoms just because the effects are largely due to processes going on in the tissue that is left behind. This was the meaning of the concept of hyperkinesis by defect, a concept illustrated in the simplest way by the excess knee jerks of pyramidal tract disease.

Dr. Southard was astonished that there was so little fibrillar gliosis in a case presenting such extensive parenchymatous disorder as did Dr. Archambault's case. Probably there was a considerable cellular gliosis in the Purkinje cell belt, a region which is frequently subject to a kind of rarefaction.

Dr. Theodore H. Weisenburg, Philadelphia, said that he had been very much interested in Dr. Archambault's paper, but that he could not agree that catalepsy is a symptom in cerebellar disease. Dr. Mills and also Dr. Weisenburg had made a study of this subject and found the opposite to be true. For example, in a right-sided cerebellar case the patient was able to maintain the position longer on the normal side than on the diseased side. If he was not mistaken Babinski had republished the original case in which this observation on catalepsy was made; he found that the case was now purely cerebellar. He could not agree with Dr. Hunt that intention tremor is a cerebellar symptom, and believed it was a manifestation of asynergy. He could not help but believe that tremor, if studied carefully by the slow moving picture method, would reveal other findings.

Dr. La Salle Archambault, in closing the discussion, said in answer to Dr. Barker that the only secondary degeneration observed was found in the zone bordering on the lateral aspect of the corpus dentatum and in the deep white matter located behind the nuclei tecti. There were no secondary degenerations in the cord, although the marginal layer occupied by the direct cerebellar tract and the anterolateral ascending tract of Gowers presented a slightly less intense coloration than the other tracts of the lateral columns. Dr. Archambault thought that this was simply due to retrograde atrophy, as there was no compensatory or secondary gliosis. Dr. Southard brought up the question of gliosis in the cerebellar cortex. Regarding this point, it was stated that a very definite hyperplasia of glia cells was observed in the molecular zone, but no appreciable proliferation of glia fibrils was seen anywhere. As to the objection raised by Dr. Weisenburg concerning the significance of cerebellar catalepsy, it was not maintained that catalepsy was a diagnostic symptom of cerebellar disease, but nevertheless it was a valuable sign and was present in three of Babinski's patients whom the author had had the privilege of seeing. It should be remembered that Babinski insisted on the fact that wide oscillations of the thighs first occurred before immobility was attained and then maintained often for an incredibly long time. Dr. Archambault's patient had exhibited this symptom with extraordinary perfection. As regards intention tremor, he had read the reprint of Dr. Mills and that of Dr. Weisenburg and remembered that these authors regarded tremor, dysmetria and adiadochokinesis as manifestations of asynergy, which is unquestionably correct, but however we are to interpret the nature or genesis of the tremor, the fact remains that intention tremor is one of the cardinal symptoms of cerebellar disease.

Dr. S. D. W. Ludlum, Philadelphia, read a paper entitled, "The Doctrine of Neutrality and Its Relation to Mental Disorder."

The paper gave an account of tests made to determine the degree of acidity or alkalinity in the fluids of the body when mental disease is present.

DISCUSSION

Dr. M. Allen Starr, New York, asked whether there were any clinical parallels between the cases of alkalinity or acidity; that is, if there was any particular form of mental disturbance which showed itself in one or the other state. Was melancholia present in the alkaline person and mania in the acid person?

Dr. Alfred Gordon thought it might be of interest to Dr. Ludlum to know that he had investigated several cases of epilepsy from his standpoint. He examined for chemical reactions not only the urine and saliva, but the blood and spinal fluid. When the chemist reported high alkalinity he gave hydrochloric acid systematically. The spinal fluid and the blood were examined two or three weeks later. There was considerable reduction in the alkalinity and there was a great diminution of the intensity and frequency of the epileptic seizures. Dr. Gordon said he would report particularly one case of a young fellow, aged 23, who used to have attacks of epilepsy daily. For a period of two weeks he did not have a single attack. Dr. Gordon said he did not mean to refer to this as a direct relation, but it was exceedingly interesting in connection with Dr. Ludlum's investigation in mental diseases. Dr. Gordon asked what Dr. Ludlum understood by the neutral. He said he did not suppose that he meant that the cerebrospinal fluid could be made other than alkaline. He said he would like to get Dr. Ludlum's view on that particular phase.

Dr. Edward M. Williams, Sioux City, Iowa, read a paper entitled, "Case of Hyperpyrexia of Doubtful Origin."

The case was that of a woman, aged 25, who was examined Jan. 15, 1916, and found to have an acute otitis media on the right side; a paracentesis had been performed in December, 1916. A simple mastoid infection occurred later for the relief of which paracentesis was again performed Feb. 5, 1918; a fistula in the right mastoid was exposed which led to the dura in the superior fossa with apparently a large cavity in the brain tissue—presumably a brain abscess. An apparently good recovery followed. The middle of March her temperature during the first few days was from 101 to 103; later from 107 to 110 F. Temperature increase recurred daily at definite periods following chills and vomiting. The rectal and oral temperature were usually taken with approximately the same relative result. The pulse never was above 114; blood examinations were all normal. A question of hysterical elevation of temperature was considered, but there was absolutely no opportunity for the patient to use any heat appliances.

Dr. Charles S. Potts, Philadelphia, said that Dr. Mills and Dr. Dercum might remember a woman who from 1882 to 1890 was a well known hospital rounder in Philadelphia. She was in the Philadelphia Hospital, and came under Dr. Potts' care while he was an intern there. During that time she represented very much the same condition that Dr. Williams has spoken of, having a temperature of from 107 to 110 F. for over a week. It was impossible by every means he could use to detect her manipulating the thermometer. The temperature was taken in the rectum, axilla and mouth, and it always very closely corresponded. She was a case of probable hysteria with a marked morbid desire for notoriety. She frequently would get a convulsion in the street car, and practically every hospital in Philadelphia had been visited by her.

Dr. M. Allen Starr, New York, said he had seen a similar case at the New York Hospital several years ago in which there was a temperature of 108 F.

Dr. Israel Strauss, New York, read a paper entitled, "Trauma and Its Relation to the Development of Glioma of the Brain."

A brief résumé of the history of five cases of gliomas, in which the symptoms appeared shortly after head trauma. Discussion of the influence of trauma in the development of tumors in general.

The susceptibility of ectodermal tissue to tumor formation as the result of irritation.

Are the symptoms of brain tumor appearing shortly after trauma due to hemorrhage in a latent glioma, or to an induced rapid growth of the tumor, or to the formation of a tumor?

Dr. S. P. Kramer, Cincinnati, read a paper entitled, "Palliative Trephining in Cases of Tumor of the Infundibular Region."

A discussion of the most favorable site for so-called decompression in tumors of the infundibular region for the particular purpose of relieving pressure on the optic nerves. The site of such operation ought not to be determined by cosmetic consideration. Pressure caused by tumor does not depend on hydrostatic pressure. A discussion of the physical principles involved.

Dr. N. S. Yawger, Philadelphia, read a paper entitled, "Hypnagogic Hallucinations with Cases Illustrating These Sane Manifestations."

GENERAL NEUROLOGIC AND PSYCHIATRIC PROBLEMS IN MILITARY SERVICE

1. "So-Called 'Shell Shock.'" The Remedy. Dr. Francis X. Dercum, Philadelphia.

2. "Shell Shock." Lieut.-Col. Colin K. Russel, Canadian Army Medical Corps.

3. "On the Nature of Nervousness Among Soldiers." Major Foster Kennedy, Royal Army Medical Corps.

Dr. Charles L. Dana read this paper for Major Kennedy, stating that Major Kennedy was unable to be present because he has been working in a base hospital in France.

DISCUSSION

Dr. Hermon C. Gordinier, Troy, N. Y., asked Colonel Russell whether he had noticed any evidences of hyperthyroidism in any soldiers suffering from shell shock, and whether blood pressure observations were made in these cases.

Dr. M. Allen Starr, New York, said that along that same line he would like to ask Colonel Russell whether examinations of the urine, or of the blood had been made. He would like to know whether, if the blood examinations were made, they gave support to the facts brought out by Cannon in his lectures at Harvard on the effect of fear and anger in animals in the production of an increase of blood sugar and the production consequently of glycosuria. He wished to knew whether any observations of that kind had been made in these cases.

Dr. H. R. Stedman, Boston, said he would like to know what happened when a man had a second attack of shell shock after being sent back to the front, and how many such attacks were thought to unfit him for military service.

Dr. Francis X. Dercum, Philadelphia, said that he felt, too, that he had not time to discuss the pathology of hysteria in detail; merely to bring forward its essential features. That in hysteria we have various visceral phenomena there can be no question. When the cortical centers lose their domination the lower mechanisms go off, so to speak, by themselves. Sometimes there is tachycardia, or other vascular disturbance. Sometimes there are symptoms presented by the gastro-intestinal tract; sometimes by the sweat and other glands. There are many variations in the clinical picture; but the important point to remember is that all of the symptoms may be correlated by suggestion, as has just been illustrated by the accounts of cases in the papers read by Colonel Russell and Major Kennedy.

Dr. Theodore Diller, Pittsburgh, said he should like to refute the statement that Colonel Russell made that he is not a psychologist. Dr. Diller thought Colonel Russell had clearly shown he was the best one in the room.

Dr. Charles K. Mills, Philadelphia, read a paper entitled "Neurologic and Psychiatric Instruction for Medical Officers."

DISCUSSION

Dr. Elmer E. Southard, Boston, said that the Philadelphia war course in neurology and psychiatry for medical officers was without doubt a better rounded course in many respects than the courses given in the other centers. Naturally, the course had had the benefit of experience in the courses at other centers which had started earlier, but a chief factor was the well known property which Philadelphia had of being a neurologic center and a center with Dr. Mills in it.

The first idea of the National Committee for Mental Hygiene was that there were neurologists enough and that the main thing was to give a brush-up in psychiatry. The psychopathic hospitals in Ann Arbor and in Boston and St. Elizabeth's at Washington were chosen for these psychiatric brush-up courses. It soon appeared that more neurologic brush-up was necessary and the New York and Philadelphia schools were started.

Then shortly came reports from the camps laying emphasis on mental tests, and the dictum went forth that not only psychologists but physicians ought to be able to give these mental tests on occasion.

As to the quality of men sent, some of the material was decidedly inadequate, raising the question whether morons could actually somehow have received medical degrees.

Dr. Southard noticed Dr. Mills' remarks that the Philadelphia course was a practical one, and that some of the courses elsewhere had perhaps been over theoretical, yet the Philadelphia work appeared to have been after all largely didactic. A really extraordinary number of lectures and demonstrations to groups had been given in the Philadelphia course. At Boston they had given almost purely practical work with the actual case material, studying it on staff rounds and at staff meetings. In particular, the psychologic work had been confined to practical test work under supervision. Dr. Southard placed emphasis on the fact that the Boston material was especially good from the standpoint of military work because it did not so much deal with the out-and-out insane as with the near insane and psychopathic groups.

Dr. Mills had rallied Dr. Southard concerning the large number of subdivisions of mental disease (from sixty to eighty-four groups) for which Dr. Southard had undertaken to be responsible. In point of fact, the choice of

from sixty to eighty-four genera of mental disease as the existent genera of today was a research matter which Dr. Southard had just brought before the American Neurological Association. The major groups of mental disease were, according to Dr. Southard, very few in number — not more than 10 or 11 — and they were virtually identical with the material found in all the best American textbooks. Seriously speaking, Dr. Southard did not feel that the charge of being over theoretical was properly to be brought against the Boston course.

Dr. Southard emphasized the importance of getting neurologic and psychiatric interns for the rapid development of proper neuropsychiatrists for the Army, intrabellum and postbellum.

Finally, Dr. Southard said he was glad to get the Philadelphia point of view, and knew it covered the ground well, though possibly it was a bit theoretical.

Dr. Francis X. Dercum said that he personally knew the course as given in Philadelphia was very practical. Dr. Mills' article also emphasized the fact equally that along with organic neurology the psychoneuroses have been taught elaborately and with great wealth of material.

Col. Theodore C. Lyster said that if he could as ably defend the Surgeon-General's Office as Dr. Southard had Boston teaching he would be happy. As to medical officers, they did not have many Campbells to protect the front lines, so these cases (so-called shell shock) did not get back. The difficulty of supplying that very class of men at this time is probably the best reason why such men could be utilized if they could be spared for this class of work. Then the question comes: How far can you train that clinical man for his work? Certainly, if you try to make him a neurologist, as just one feature of his education, then try to add to that the various conditions actually met with — we know that was impossible at the start and is impossible now. Of course, team work is the only way that it can be approximated. Careful work in the physical examination and care of men at the front. One of the earliest reasons that existed for the establishment of the neurologic school which Dr. Frazier has so ably handled in Philadelphia, was that they realized that neurologic surgeons would be sadly needed at the front. The subject has been developed far enough to call on the civilian medical men to supply the necessary personnel. They were anxious to at least have one or two neurologic men placed at these front points to help out with these undetermined diagnoses, even to help that man who by training could perform all the functions of a well grounded man. It ended in a course of instruction being established which, while it met the immediate needs, had to be necessarily of a limited character. From this school they had hoped to train — rather supplement the training of neurologic surgeons to make up surgical teams both in this country and abroad. The Surgeon-General's position is that while he is willing to urge the early induction of medical interns into the various schools that are supposed to lead to special training, it should be remembered that the number of desirable men available is naturally far below what it should be. They will feel safer when they know most of the branches that they desire are represented.

Dr. Charles K. Mills, in closing the discussion, said that as far as he knew Boston, with regard to neurology, medicine or anything else, has never yielded, in its own mind at least, its position as the "Hub of the Universe." He still supposed that the rest of us should be regarded as spokes in Boston's hub. Dr. Mills thought it was unfair for Dr. Southard to say that 90 per cent. of

the teaching in Philadelphia was didactic. Dr. Mills should say probably only 30 per cent. — and that largely anatomic and pathologic. The Philadelphia instructors had continuously exhibited patients and had, so far as possible, had the students examine cases. Dr. Mills said he did not know exactly what Dr. Southard meant, but he could not conceive that the doctor had students in his psychiatric wards and had allowed them to go around in his presence without talking to these students. In Philadelphia, in addition to allowing students to do much work for themselves, this is what has been done.

Col. Pearce Bailey, New York, read a paper entitled, "Work of the Division of Neurology and Psychiatry."

This paper was profusely illustrated by lantern slides and given with closed doors.

Major Graeme M. Hammond, New York, read a paper entitled, "Neurology and Base Hospital Work."

Major Menas S. Gregory, New York, read a paper entitled, "The Examination of the Recruit and Cantonment Work."

Dr. Charles L. Dana, New York, read a paper entitled, "Reconstruction Problems in Neurology and Psychiatry."

Major Robert M. Yerkes, Washington, D. C., read a paper entitled, "Psychological Examining in the United States Army."

Dr. M. Allen Starr, New York, said that Dr. Hammond and Dr. Bailey had shown the need of medical officers in the Army, the intense need of them, and we know that in *The Journal of the American Medical Association* recently the Surgeon-General has put out an appeal for the enlistment of further medical men in the Army. Dr. Hammond has told us that, if the order of Dr. Bailey is carried out, one man only will be assigned to a base hospital, and that man will be overworked in every way. Now Dr. Starr would like to ask Dr. Bailey as the colonel of this division, to let us know why it is that the Army medical department refuses to accept the services of many of us who, though beyond the age and probably wholly incapable of passing these examinations which we have heard about, yet are still of fair amount of use in the world and are exceedingly willing and very anxious to give our services to the government. We all know that in the hospitals of this country there exist consulting boards — consultants who are called on by the attending physician or by the intern to come in and help along for diagnosis in cases in which there is a doubt. These men are not limited in their service to the hospital, although in Dr. Starr's experience they are willing to go day or night voluntarily to fulfill their duties. Now it seemed to him that here in this organization we have 200 men and we have been told that only twenty-two are in the service. We have 200 men whom Dr. Starr was sure were in no way deficient in patriotism, and it seemed to him that the government could make use of them, and if there was, as we are told, this deficiency in the material that the government ought to make use of us; and yet he thought that it was not incumbent on us to offer our services, which would undoubedly be declined on account of our age, for full, continuous, active and constant labor. The thing had been brought to the attention of Dr. Starr particularly through the statement by Dr. Hammond. There was the camp where Dr. Hammond was in service, three-quarters of an hour or an hour by automobile from New York. In New York there were certainly twenty-five men who would willingly serve in that camp as consultants three or four hours

every day, or twice or three times a week, as the case might be, and Dr. Hammond's labors would thereby be markedly lightened. If Dr. Hammond needs six men every day, and he is there alone, why should not he have five men to come up every day and help him out? Dr. Starr said he had put this matter before the members of the association because he thought the members ought to express formally their willingness to put their services at the aid of the government, and have it understood that the government can call on them for services of this kind as consultants or as active attending physicians for certain times, if not constantly. Now this was not a new thing. We know perfectly well that in the hospitals of Paris and all over France, in the hospitals of London and all over England, medical men — Sir William Osler, for instance — are acting in this capacity. There are men of every age and standing who are giving their services, and whose services are eagerly accepted. Dr. Starr said he would like to have Colonel Bailey, if he can, make some statement as to why the government of the United States should not so use members of the American Neurological Association.

Gen. Theodore C. Lyster, Washington, D. C., read a paper entitled, "The Work of the Aviation Section, Signal Corps, U. S. A."

Col. Georges Dreyer, Royal Army Medical Corps, read a paper entitled, "Medical Aviation Problems in Active Service."

Major Stewart Paton, Princeton, N. J., presented a paper entitled, "Psychiatry and Aviation."

Lieut.-Col. William H. Wilmer, Washington, D. C., presented a paper entitled, "The Eye and Aviation."

Major Eugene R. Lewis, Dubuque, Iowa, read a paper entitled, "The Ear and Aviation."

Book Review

LES BLESSURES DE LA MOELLE ET DE LA QUEUE DE CHEVAL. By GUSTAVE ROUSSY, Professeur agrégé á la Faculté de Médecine de Paris, and Jean Lhermitte, Ancien chef de Laboratoire á la Faculté de Médecine de Paris. Pp. 202, avec 8 planches hors texte. Paris: Masson et Cie, 1918.

What the French in their expressive language and graphic way have called *la neurologie de guerre* stands as one of the war monuments to this remarkable people. How the neurologists of France aided their government in its organization of the medical service for proper care of the nervously and mentally sick; with what patience and success they investigated the manifold injuries of the nervous system, and with what astuteness they quickly recognized the psychoneuroses and promptly cured most of them, are already matters of record — imperfect record to be sure. In these divers activities Roussy and Lhermitte have played no inconsiderable rôle, and the present little volume is one of the fruits of their labors.

As Pierre Marie says in his preface of the present work, to see a large number of cases of trauma of the cord, to observe them immediately after the injury and then follow them for weeks and months; to have the opportunity for painstaking clinical investigation and for microscopic postmortem examination; and also be qualified to do both clinical and pathologic work in magisterial way, surely is given to few men. These exceptional advantages were those of the authors of this book.

It is divided into four parts: I, Injuries of the Spinal Cord (117 pages); II, Lesions of the Cauda Equina and Conus (27 pages); III, Complications (29 pages), and IV, Treatment (10 pages).

The first part treats of (1) complete division of the cord; (2) incomplete division; (3) pathologic anatomy; (4) concussion of the spinal cord, and (5) diagnosis of cord injuries. All injuries are considered from the chronological standpoint, the importance of which is often not appreciated. Immediately after the trauma, injuries of vastly different significance may present almost identical clinical pictures. Also, the various injuries are considered with reference to the different levels. Not only do the authors consider complete and partial Brown-Séquard paralysis, but describe a new type of partial division — posterior hemisection.

One of the most interesting chapters in the book is that on concussion of the cord (*les commotions spinales*). But concussion is scarcely the proper word for the conditions described. Contusion would be a better word, but contusion in the sense of mass perturbation. The carefully detailed symptoms as well as the microscopic findings (well illustrated) will be a revelation to many readers.

To devote one whole part of the book to complications was a happy thought. For their importance needs to be impressed on internist and surgeon. "Often the prognosis depends more on the complications than on the cord lesion." We believe that relatively few medical men appreciate the why of these complications and are familiar with the means of their prevention.

In the section on treatment, as regards injury of the cord the position of the authors is that of great conservatism, for which they give cogent reasons. Injuries of the cauda are quite another matter and surgical intervention is much oftener advisable. Finally they give the conclusions of the interallied surgical conference on injuries of the spinal cord.

Although the book is based on war work, it has lost little of its value. The mechanism of trauma of the cord is always the same, and the accidents of civil life often are similar to those of military activity. The means of diagnosis, including localization, remain as they were. War and its hazards alter neither anatomy, physiology nor pathology. Given a certain condition of the cord and its surroundings, the treatment indicated is identical whether the remote cause was malignant intention, human frailty or celestial oversight. Roussy and Lhermitte have given us a timely and most useful monograph.